DOCUMENT RESUME

ED 402 454 CE 073 101

AUTHOR	Hensley, Oliver D., Ed.; And Others
TITLE	The Texas Tech Prep Consortia: Strategies for Advancing Academic and Technical Education.
INSTITUTION	Texas Tech Univ., Lubbock.
SPONS AGENCY	Texas Higher Education Coordinating Board, Austin.
PUB DATE	Oct 96
NOTE	244p.; Product of the Strategic Planning, Evaluation of Curriculum, Assessment of Performance Research Group. For related documents, see CE 073 099-100.
PUB TYPE	Collected Works - General (020) -- Viewpoints (Opinion/Position Papers, Essays, etc.) (120)
EDRS PRICE	MF01/PC10 Plus Postage.
DESCRIPTORS	*Articulation (Education); Career Guidance; Cooperative Programs; Educational Planning; Educational Practices; Education Work Relationship; Guidelines; High Schools; *Institutional Cooperation; Program Development; Program Implementation; School Business Relationship; State Programs; *Tech Prep; Two Year Colleges; *Work Experience Programs
IDENTIFIERS	*Texas

ABSTRACT

This book contains 30 chapters on the tech prep initiative in Texas: "The Identity of Tech Prep in Texas" (Tunstall); "A Snap-Shot of the Impact of the Tech Prep Initiative in the Governor's 24 Planning Regions" (Brown); "The Tech Prep Consortium Directors: The Architects for the Future of Texas" (Hensley et al.); "Tech Prep: Jewel in the Crown" (Pickle); "Synthesis of Literature Related to Tech Prep Outcomes" (Key); "North Texas Tech Prep Consortium" (Vaughan); "The Rationale for Tech Prep in the Panhandle of Texas" (McGee); "The Seguin Center for Career Excellence" (Lawlis); "Career Preparation Today for Tomorrow" (Elmore); "Making Our Students Marketable" (Schatz); "Collaboration at Its Best" (Pfeifer); "Career Pathways: A Holistic Approach" (Sanford); "Shadowing Programs for Small Rural Communities" (Wendt); "Apprenticeship Training: The Electromechanical Technology and Agricultural Science and Technology Connection" (Lovelady); "Transfer Planning Guides: A Southwest Texas Approach to Transfer Opportunity" (De Leon); "Working with Senior State Institutions to Establish Transfer Credits for Various Departments and Majors" (Springer); "SCANning the Curriculum: Teaching Workplace Skills" (Hull); "Integration of Academics with Career and Technology through Development of Community Contacts" (Duke); "Epistecybernetics: A New Way of Thinking about Developing, Articulating, and Evaluating Tech Prep Curricula" (Hensley, Rivers); "The Calculus Knowledge Register for Tech Prep" (Sisler); "Creating an Information, Market-Driven Education and Workforce Development System: The Role of Labor Market and Follow-up Information" (Froeschle); "An Analysis of Tech Prep Strategic Planning" (Hensley et al.); "A SWOT [Strengths, Weaknesses, Opportunities, Threats] Analysis of the Texas Approach to Tech Prep Development" (Opp); "Tech Prep--The English Translation" (Sutliff); "The Summer Jobs for Youth Program: An Investment in the Future Well Worth the Price" (Bloomquist, Lackey); "The Importance of Private-Sector Leadership in Tech Prep" (Maldonado, Bubb); "Motorola Career Pathways Program: From School-to-Work to Workforce Development" (Green); "Work that Educates: How to Make Structured Work-Based Learning Work" (Egloff); "Dialogue between Educators and Industry: The Link to Institutionalization of Tech Prep Programs" (Krause); and "Education, Technology and the World of Work: Creating the Future" (Schmitz, Schmitz). (KC)

ED 402 454

The Texas Tech Prep Consortia:

Strategies for Advancing Academic and Technical Education

Oliver D. Hensley
Ronald D. Opp
Bethany C. Rivers

October 1996

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☑ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

● Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL HAS BEEN GRANTED BY

R. D. Opp

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

CE073161

BEST COPY AVAILABLE

SPECAP
Strategic Planning
Evaluation of Curriculum
Assessment of Performance

The Texas Tech Prep Consortia:

Strategies for Advancing Academic and Technical Education

Editors:
Oliver D. Hensley
Ronald D. Opp
Bethany C. Rivers

Effective Policies and Practices in Selected Career Fields
Lubbock, TX: Texas Tech University, SPECAP Research Group

a Carl Perkins Grant
Project Number 66180003
FICE Code 003644
August 1996

The Texas Tech Prep Consortia: Strategies for Advancing Academic and Technical Education

Table of Contents

Preface *vii*
Oliver Hensley, Ronald Opp, & Bethany Rivers
Acknowledgements *xii*

I. An Introduction to Tech Prep in Texas

1. *The Identity of Tech Prep in Texas* *1*
Ken Tunstall

2. *A Snap-Shot of the Impact of the Tech Prep Initiative in the Governor's 24 Planning Regions - State Summary* *5*
Carrie Hughes Brown

II. Consortia Contributions

3. *The Tech Prep Consortium Directors: The Architects for the Future of Texas* *18*
Oliver Hensley, Ronald Opp, & Pamela Cooper

4. *Tech Prep: Jewel in the Crown* *23*
Douglas L. Pickle

5. *Synthesis of Literature Related to Tech Prep Outcomes* *28*
Casanda (Cassy) Key

6. *North Texas Tech Prep Consortium* *45*
Romona Vaughan

7. *The Rationale for Tech Prep in the Panhandle of Texas* *51*
Lynn McGee

III. Independent School District Collaborations

8. *The Seguin Center for Career Excellence* *56*
Janette Lawlis

9. *Career Preparation Today for Tomorrow* *61*
Geralyn Elmore

10. *Making Our Students Marketable* *67*
Gene Schatz

11. *Collaboration at its Best* 73
Jeri Pfeifer

12. *Career Pathways: A Holistic Approach* 80
Patsy Sanford

13. *Shadowing Programs for Small Rural Communities* 84
Charles Wendt

IV. Community College and University Advancements

14. *Apprenticeship Training: The Electromechanical Technology and Agricultural Science and Technology Connection* 89
Jim Lovelady

15. *Transfer Planning Guides: A Southwest Texas Approach to Transfer Opportunity* 94
John E. De Leon

16. *Working with Senior State Institutions to Establish Transfer Credits for Various Departments and Majors* 101
Stephen A. Springer

V. Curriculum Development

17. *SCANning the Curriculum: Teaching Workplace Skills* 107
Pamela Hull

18. *Integration of Academics with Career and Technology Through Development of Community Contacts* 113
Sarah (Sally) Duke

19. *Epistecybernetics: A New Way of Thinking about Developing, Articulating, and Evaluating Tech Prep Curricula* 117
Oliver Hensley & Bethany Rivers

20. *The Calculus Knowledge Register for Tech Prep* 125
Peter Sisler

VI. Government Strategies for Tech Prep Advancement

21. *Creating an Information, Market-Driven Education and Workforce Development System: The Role of Labor Market and Follow-up Information* 133
Richard Froeschle

22. *An Analysis of Tech Prep Strategic Planning* 138
Oliver Hensley, Ronald Opp, Pamela Cooper, Bethany Rivers, & Gloria Stewart

23. *A SWOT Analysis of the Texas Approach to Tech Prep Development* 154
Ronald D. Opp

24. *Tech Prep -- The English Translation* 163
Lynda Sutliff

25. *The Summer Jobs for Youth Program: An Investment in the Future Well Worth the Price* 167
Denise M. Bloomquist & Cynthia Lackey

VII. Industry & Tech Prep Partnerships

26. *The Importance of Private-Sector Leadership in Tech Prep* 174
Cesar Maldonado & Pat Bubb

27. *Motorola Career Pathways Program: From School-to-Work to Workforce Development* 182
Sharon Knotts Green

28. *Work that Educates: How to Make Structured Work-Based Learning Work* 192
Robert A. Egloff

29. *Dialogue Between Educators and Industry: The Link to Institutionalization of Tech Prep Programs* 202
Steven J. Krause

VIII. Economic Development from Tech Prep

30. *Education, Technology and the World of Work: Creating the Future* 214
Charles Schmitz & Elizabeth Schmitz

About the Authors 221

7

PREFACE

Introduction. The primary aim of *The Texas Tech Prep Consortia: Strategies for Advancing Academic and Technical Education* is to help the reader gain a deeper insight into the complex and diverse world of Tech Prep in Texas. We believe that Tech Prep in Texas is a unique phenomenon. Our intention is to document the Tech Prep processes and products that are making a difference in the educational system of Texas. For those who have been involved in Tech Prep for some time, the vast diversity of these processes and products is not surprising. For many, the details provided in this monograph will be of particular interest because Tech Prep is about action: integration, application, and evaluation. These details are easy to miss unless they are somehow documented and shared.

In 1995, your editors were awarded a Tech Prep supplemental grant to the SPECAP Research Group for the purpose of documenting the Strategic Planning, Enhancement of Curriculum, and Assessment of Performance activities occurring in the Tech Prep Consortia. SPECAP conducted a comprehensive study of the planning and implementation of Tech Prep programs covered in the 1992-93 Carl Perkins grant proposals submitted to the Texas Higher Education Coordinating Board. These proposals included planning systems from October of 1991 through June of 1995.

Through document analyses, questionnaires, telephone interviews, and site visits, the SPECAP investigators found that all education in the state has benefited greatly through the careful planning and implementation of Tech Prep programs. The most recent research, from 1995-96, shows that the consortia are consistently achieving what they proposed to accomplish. These studies have found that Tech Prep planning and implementation of programs are guiding a revolution in educational thinking in the public schools and colleges of the state of Texas and that Tech Prep associates are supplying the state's businesses and public agencies with a highly competent, technical workforce.

The monograph intends to document claims of successful planning, marketing, and institutionalization of Tech Prep programs. Mostly, *The Texas Tech Prep Consortia: Strategies for Advancing Academic and Technical Education* provide a series of diverse pictures of what has happened to Texas education since the advent of Tech Prep. In a small way, this monograph provides some recognition of successful processes and products by pointing to a few exemplary programs in order to share their success stories.

Source of Articles. A major source of information for this monograph had its origins in papers written by Tech Prep stakeholders. The Tech Prep Directors' Association of Texas sponsors a yearly state conference to share Tech Prep ideas among the thousands of Tech Prep stakeholders. The 1996 Tech Prep State Conference participants used the theme "Outside the Box Solutions." More than 200 papers were presented. In the spring of 1996, we asked the SPECAP Advisory Council to identify from the 200 conference papers those papers they knew would provide clear examples of exemplary planning that advanced Tech Prep goals. Fifty-six papers were identified for possible inclusion. After peer reviews, 30 papers were accepted.

Organization of Monograph. Strategic planning for Tech Prep is a process of establishing a common understanding among stakeholders and setting goals to improve the connection between technical education and its chief partners and major constituencies. In chapter one, Tunstall opens the monograph discussing the identity of Tech Prep in Texas and explaining the state strategic plan for Tech Prep. Derived from the many proposals that outlined the development of Tech Prep options within the Governor's 24 Planning Regions in Texas, Tech Prep in Texas has positioned the state for the future through regional planning and local growth. Brown, in a distillation of her comprehensive status report, provides a snap-shot of the impact of Tech Prep in the Governor's 24 planning regions. The article is rich with evidence of the progress made in Texas and emphasizes the importance of maintaining grass-roots efforts.

Hensley, Cooper, and Opp open the second section discussing their belief that the directors serve as the architects for the future of Texas. Applauding those individuals who work so diligently to create a Camelot, the article subtly highlights the success of the consortium model that the directors represent. Pickle concludes that Tech Prep is the dominant jewel in education's crown, as he gives important information on curriculum development and the involvement of business and industry in the Panhandle region. Opening with an example from her region, Key thoroughly describes Tech Prep, launching into the background and supporting literature responsible for Tech Prep. She then proceeds to list and describe elements that research suggests any articulated programs, such as Tech Prep, must have to be successful. Some of these elements are easily found in the next article as Vaughn gives a day-to-day description of the details that a Tech Prep consortium coordinates, describing the kind of activities that empower Tech Prep stakeholders and generate information for possible future partners. It is interesting to note how far and varied resources are effectively demonstrating that though we consider consortia multi-layered organizations, there is a larger, developing layer of cooperation -- a national effort, willing and excited about sharing information and improving education in America. From one of the consortia leading the state in approved programs and articulation agreements, McGee gives a rationale for Tech Prep in the Panhandle of Texas. The article describes some of the processes it has used to implement changes -- including the development of the algebra curriculum that set the state on fire.

Lawlis starts off the third section with a description of the Seguin Center for Career Excellence. She explains how strategic planning is about the work of moving the local community, its partners, and its constituencies in a direction that will contribute to an integrated system of education and training services that ensure that all students acquire basic academic and employment skills through collaborative efforts of grassroots partnerships committed to long-term systematic change. Elmore discusses counseling and career preparation and development in Lexington ISD with an emphasis on buy-in and integrating career counseling into the K-12 curricula. Schatz discusses a rigid high school plan that he uses at his school in Whitney, Texas, which is enjoying some real success. Whitney High School uses multiple learning approaches and assessment measures to tailor education to meet individual student's needs. Pfeifer identifies a problem in which too many students making their way through high school have little knowlege of their career options and even less understanding of how their course selections are tied to their eventual careers. She describes the steps taken in her region of adding career planning to the curriculum in the lower grades, thus helping students learn about career options at a much younger age. Sanford tells the story of how Belton ISD implemented Career Pathways to help students establish an early career goal in order to select appropriate and meaningful course work. Wendt offers some simple steps, such as talking to business and selecting students for a shadowing program, in order for business to become more involved with the education and training of young people.

In section four, Lovelady, a long-time dean for technical education at Angelina College, discusses apprenticeship training in the Deep East region of Texas. He shares how the Tech Prep program at Angelina College, through cooperation with local industry, utilizes skills learned by students in high school agriculture education programs. DeLeon shares his ideas on credit transfer and discusses the processes he went through to develop a transfer planning guide. Springer explains the complexities, goals, and concerns of large senior institutions with respect to the task of achieving articulation agreements. He introduces successful methods to achieve articulation agreements which must first start with the senior institution's willingness to buy-in to a program.

Hull, in "SCANning the Curriculum: Teaching Workplace Skills," opens up the fifth section on Curriculum Development. She acknowledges the success of articulation agreements and in-service training programs that later follow Tech Prep consortia plans. Duke, in her article on academic and technical education, describes how Tech Prep is forming the foundations for our technological civilization as she describes a pilot health science technology class at her high school. Hensley and Rivers present a detailed look at one solution for effectively designing curricula and school courses by eliminating duplication through epistecybernetics -- attacking duplication and redundancy in the textbooks and in our daily assumptions about how subjects should be taught. Sisler continues the discussion on epistecybernetics with an example; a breakdown of calculus into teachable and technological segments.

Froeschle begins section six on Government Strategies for Tech Prep Advancement. He diagrams SOICC's model, an information driven workforce education development system that will promote an ordered development. Hensley, Opp, Cooper, Rivers, and Stewart have produced an informative article based on research from their previous year's grant. Using several strategic planning models, they retrace and identify the path that many consortia took to implement successful programs. From a wider viewpoint, Opp looks at the development of Tech Prep in Texas, and the decisions that were made to keep cooperation between agencies, communities, and corporations high and enthused in Texas. Sutliff takes her readers a step further as she gives us a quick study of the differences between the English schooling system and the philosophy behind Tech Prep in Texas. Bloomquist and Lackey delineate a simple plan for the organization and operation of a successful Summer Jobs for Youth. The article describes a type of planning that requires considered and innovative thought about the future and a product which will impose a discipline and direction on the technical training efforts of all who come under its purview.

Maldonado and Bubb start out section seven on Industry and Tech Prep Partnerships. They point to the importance of private sector leadership in Tech Prep and to leadership that advances a shared interest in demonstrating a responsiveness to the needs of business, industry, and labor, in advancing technology, and in providing productive employees. Green outlines the major steps to implement a Career Pathways program at Motorola, with general steps covering education and assessment. Egloff provides some practical suggestions on how to make work-based learning a vital complement to school-based learning. The article focuses on a basic model that includes technical skills and worksite learning plans. Krause presents a case study based on SPECAP research findings on the Process Technology program in the Gulf Coast Consortium. His article highlights the importance of dialogue between educators and industry at the curriculum development stage in order to achieve program success and eventual institutionalization of Tech Prep.

The concluding article by Schmitz and Schmitz covers the innovative uses of telecommunication and multimedia technologies to bring the world of work to schools. The article discusses how any educational reform and renewal movement like Tech Prep can better achieve its promises by taking advantage of technological advancements.

Tech Prep is an emergent discipline. It has its roots in the vocational and technical education of public schools and community colleges, but it is quite a different phenomena from its predecessors. As the first Tech Prep monograph, we have, through our peer review process, tried to select a wide distribution of relevant articles, to show the complexity of the Tech Prep enterprise in Texas. Also, we have selected articles that reveal the distinguishing character of this new movement. Although we are quite proud of the articles in this collection, we realize that thirty articles can not show the totality of what is happening in Texas. However, we hope that the monograph and its articles will serve as the prototype for more serious studies on a program that is making a dramatic difference in education.

Oliver D. Hensley
Ronald D. Opp
Bethany Rivers

Acknowledgments

A special "thank you" goes to Carrie Brown, our Advisory Council, and Pat Bubb for their continued support. We are also grateful for the time and energy spent by our authors to make this monograph possible. They were very willing to help out in so many ways: meeting deadlines, reviewing papers, and basically responding to each of our many requests. Special thanks also goes to all of our colleagues for their dedication and commitment to this team effort during the past year. We could not have completed this project without their assistance. Any project of this magnitude requires teamwork from a lot of players. Therefore, to everyone who contributed to the monograph, WE THANK YOU!

Editorial Board
and
Advisory Council Members

Myrna Albin
Vocational Specialist, Ysleta ISD

Robert Franks
Director, Tech Prep at Navarro College

Luis de la Garza, Jr.
Director, South Texas Tech Prep Consortium

Jim Lovelady, Ed.D.
Director, Technical-Vocational Division, Angelina College

Debra Nicholas
Director, Alamo Tech Prep Consortium

Becky Weaver
Educational Program Advisor, Central Power and Light Company

Douglas L. Pickle, Ed.D.
Professor and Division Chair, Industrial Technology, Amarillo College

D'Arcy Poulson
Director, Concho Valley Tech Prep Consortium

Lee W. Sloan, Ph.D.
Dean, Division of Occupational Education & Technology, Del Mar College

Editorial Staff
Oliver D. Hensley
Ronald D. Opp
Bethany Rivers

Research Associates
Steven J. Krause
Gloria Stewart

Support Staff
Ismael Amaya
Brooke Busken
Ariana Cox
Jessica Creswell
Eric Gerlach
Robyn Hudson
Delores Keller
Jill Slapper
Tara Standifer
Mikki Wilks
Stephanie Williams

THE IDENTITY OF TECH PREP IN TEXAS

by
Ken Tunstall
Director, Workforce Education
Community and Technical Colleges
Texas Higher Education Coordinating Board
7745 Chevy Chase Drive, Building V
P.O. Box 12788
Austin, TX 78711
(512) 483-6250

Tech Prep in Texas is a truly unique phenomenon. The movement represents the first successful initiative that has provided measurable, systemic K-16 educational reform for Texas. Tech Prep in Texas began as a tri-agency-supported partnership to promote and support comprehensive educational restructuring and lifelong learning for all students. Because of its systemic approach to workforce education, Tech Prep continues to create an environment supporting relevant education while allowing for regional diversity and providing equal access for all students. One of the biggest fears that many have had as the Tech Prep movement has progressed is that the Tech Prep efforts into which they have put their hearts will some day be legislated away.

Background. The Tech Prep state mission in Texas has always been to forge partnerships within communities. These partnerships are intended to foster high-performance education processes with access and support for all people that will result in effective, efficient education enterprises leading to an academically and technically skilled workforce with increased career choices. Such workforce initiatives typically provide an enhanced quality of life for citizens of communities who, through economic security, possess the ability to adapt to the future.

At a time when most states were funding isolated demonstration projects, Texas implemented Tech Prep as a decentralized, statewide system for educational reform, emphasizing collaboration, connectivity, and cooperation at local, regional, and state levels. Between July 1, 1991, and June 30, 1992, Texas created twenty-five regional Tech Prep consortia in the Governor's twenty-four planning regions. The consortia use targeted occupations information from regional labor market information committees to develop plans which promote career counseling in all grades and outline rigorous academic and technical coursework starting in the ninth grade, culminating in an apprenticeship or in an advanced associate degree. Multiple entry and exit points are mandated, as is the opportunity for continuation through a baccalaureate degree. State-level consistency is achieved through collaboration among consortia directors, state inter-agency staff, and the leaders of various local, state, and national associations. The Texas Higher Education Coordinating Board (THECB), in cooperation with the Texas Education Agency (TEA) and the Texas Department of Commerce (TDOC), has served as the administrative and fiscal agent for the movement since its conception, providing over $40 million in funding for state and regional activities to Texas under Title IIIe (the Tech Prep Act) of the Carl D. Perkins Vocational and Applied Technology Act of 1990 and through millions of dollars of locally-leveraged funds. Tech Prep continues to be supported by the state's expanded inter-agency workgroup and, therefore, continues to play a major role in Texas' plans to develop a comprehensive workforce and economic development delivery system.

The Tech Prep strategic plan provides leadership in support of community partnerships that advance national, state, and local Tech Prep initiatives. Such a structure has worked best when the consortium steering committee has worked closely with the consortium fiscal agent and has taken seriously its responsibility to hire a consortium director and staff who are able to effectively carry out the goals and objectives of the grant. In all regions, Tech Prep consortia serve as "umbrella organizations" providing opportunities for educators, service providers, employers, parents, students, and the community to all work together. Both employers' needs and individual students' needs are served through Tech Prep curricula, which advocate strong parent and community involvement. Employers, teachers, counselors, administrators, support staff, parents, and students have been (and continue to be) involved in regional activities. All stakeholders have a voice, providing a collaborative atmosphere at local, regional, and state levels.

The Tech Prep state tactical plan to develop solid working relationships among business, government, and education partners in order to allow for the immediate and concurrent planning and implementation of Tech Prep initiatives in Texas must be carried out, for the most part, by the consortium director and staff who should be commended for their efforts toward regional cooperation and collaboration. The men and women who have served our state as Tech Prep directors over the past five years are among the most talented, creative, and dedicated of leaders and are without equal regarding their innovative vision for workforce and economic development. Through their pioneering efforts, Tech Prep consortia are rightfully regarded as the "foundations of regional partnerships" in Texas that will live on even as different structures for local collaboration evolve. Texas' Tech Prep consortia, in cooperation with regional labor market information and planning committees, have been especially effective in providing a forum for regional, grassroots collaboration. The state staff tries to provide appropriate philosophical, structural, organizational, and technical support to each consortium and director without directing the day-to-day management of consortium staff or of activities.

Update and Outcomes. Tech Prep is in its sixth year of measured success in Texas. After one year of planning and four years of implementation, the state-wide impact of Tech Prep initiatives are being felt. As of February 1, 1996, more than 87 percent of Texas' independent school districts with secondary-level technical programs and 64 of Texas' 72 public, two-year campuses have approved Tech Prep programs. Since 1990, more than 114,000 teachers, counselors, and administrators have participated in professional development activities, including the more than 2,000 who attended the joint Tech Prep/School-to-Work Conference in Austin this year. Preliminary data verify that over 96,000 students were actually enrolled in Tech Prep educational pathways during the 1994-1995 school year.

Support to Consortia. In addition to the funding of grants for planning and implementation to the twenty-five consortia, the Tech Prep state staff annually awards grants to colleges that provide supplemental services to the partnerships. Currently these discretionary awards are being funded in the areas of professional development, curriculum development, School-to-Work apprenticeships, and effective strategic planning. Technical assistance is being provided to consortia on an "as needed" basis. As with all degree and certificate programs at Texas public community and technical colleges, Tech Prep programs are subject to evaluation by the THECB. This process requires annual reports from the institutions and site visits at least once every four years. In addition, the state staff has employed an independent contractor to evaluate Tech Prep according to federal and state criteria.

Current Issues. Tech Prep stakeholders are leading the initiative to make comprehensive workforce education available to all students. In Texas, this is being done through state and local School-to-Work partnerships and One-Stop Career Centers as leaders recognize the power of being able to build on Tech Prep efforts in support of other initiatives. It is probable that Local Workforce Development Boards will assume some School-to-Work responsibilities in many regions as new federal block grants for workforce education and training become realities. Tech Prep may not be funded as a separate initiative in the future, but it is important that partnership efforts continue their focus on comprehensive, seamless, articulated workforce education programs. As evidenced by its acceptance into the educational mainstream, many communities believe that continued development and implementation of Tech Prep programs are vital to Texas. Although many Tech Prep programs will qualify as School-to-Work programs, not all School-to-Work programs will involve an associate degree and not all will be in the technical areas. For this reason and others, it remains important to maintain the identity of Tech Prep while using the lessons learned from it as it takes its place as a part of future educational reform. Texas' stakeholders took seriously the challenge to make Tech Prep a foundation for future efforts and will likely doubt promises of new initiatives that fail to respect the efforts of those who listened.

A SNAP-SHOT OF THE IMPACT OF THE TECH PREP INITIATIVE IN THE GOVERNOR'S 24 PLANNING REGIONS

by

Carrie Hughes Brown
Director
Tech Prep/School-to-Work Management & Evaluation Project
Region V Education Service Center
2295 Delaware Street
Beaumont, TX 77703
(409) 654-6425

Introduction. This *Status Report* is designed to show the progress and impact (*from July 1991 to March 1996*) of the development of 25 regional Tech Prep consortia within the Governor's 24 planning regions, and to emphasize the importance of maintaining this grass-roots effort.

Tech Prep in Texas is designed to be an integral part of a consolidated system of work force development that provides life-long education and training opportunities for all children, youth, and adults. Tech Prep contributes directly to the development of this system by offering public school students, ***regardless of their skill level, economic status, or geographic location***, a first-chance for achievement of basic, academic, technical, and workplace skills that prepare for the jobs of tomorrow, and increased opportunities for postsecondary education and training.

During the first four and one-half years of federal funding for Tech Prep, the 25 regional Tech Prep consortia, their representatives, and state leaders have:

- established an extensive network of secondary and postsecondary teachers, counselors, and administrators;
- formed hundreds of linkages with small and large businesses and industries, and labor organizations;
- formed working relationships with the job training partnership/private industry council system, the regional quality work force planning committees, community-based and civic organizations, and local, regional and state agencies and associations;
- established improved vocational and technical programs of instruction in public schools and colleges that connect learning to the realities of the workplace;

- narrowed the gap between secondary and higher education for more students; and
- established policies and procedures that assimilate Tech Prep philosophy and processes with the day-to-day operations of public schools and colleges.

As a result, the impact of the Tech Prep initiative in Texas is widespread, and the potential cost savings for participating high school students who no longer must pay college tuition, fees, and related costs for duplicate course material, or for academic remediation, can only be estimated.

The profiles of Tech Prep development in each of the state's diverse planning regions outlined in this report do not adequately represent the immense contribution of the thousands of Tech Prep consortium members to the development of a seamless, affordable, and responsive statewide system of work force education and training for Texas.

Tech Prep: Educational Goals for Economic Growth. Tech Prep allows local control and flexibility in the selection and development of work force education programs within a state framework for reform. The goals of this collaborative process are:

- Goal 1: To contribute the cornerstones of an integrated system of education and training services that ensure all students acquire basic academic and employment skills through collaborative efforts of grass-roots partnerships committed to long-term, systemic change.
- Goal 2: To demonstrate responsiveness to the needs of business, industry, and labor, and to advances in technology, and to provide productive employees, by cooperative program development and design.
- Goal 3: To make higher education in Texas more affordable and accessible to Texas' public school and college students through seamless options and opportunities.
- Goal 4: To provide appropriate pre-service and in-service professional staff development for all sectors for continuous improvement of the work force.
- Goal 5: To improve student achievement and retention, and to evaluate student progress and employer satisfaction, for continuous improvement of the work force.
- Goal 6: To inform citizens of Texas of educational and employment opportunities, to market programs, and to inform and recruit students through individualized career guidance and counseling.

Benchmarks toward attainment of these long-range goals are suggested throughout the data in this snap-shot, particularly in the areas of program development and implementation; consortium organization and governance; and federal funding.

Articulation Agreements and Tech Prep Program Development. The number of articulation agreements among community and technical colleges and independent school districts, as well as the number of participating high schools, increased dramatically since implementation of the Tech Prep initiative in 1991.

Formal articulation agreements increased from 540 in fall 1990 to 4,576 in fall 1995, and the number of participating high schools increased from 401 in fall 1990 to 4,545 in fall 1995. These articulation agreements include those associated with Tech Prep programs and other forms of course articulation. High school count is duplicate as most colleges articulate programs with the same high schools in the region.

The potential cost savings for Texas families can only be estimated. *If one-half of the current Tech Prep secondary school enrollment of approximately 50,000 students articulates a single 3 semester credit hour course (approximate tuition $100), the savings is $2,500,000. A decrease in necessary academic remediation will result in additional savings.* Although Tech Prep features this cost- and time-saving incentive, Tech Prep is more than articulated courses and programs.

Tech Prep is employer driven. Each Tech Prep consortium represents a collaborative partnership led by a governing board with significant representation and active participation of regional business and industry. School-based and work-based curricula in Tech Prep programs are designed with employer input to ensure that employers get employees with the required basic, technical, and workplace skills.

Tech Prep is universally available. All independent school districts and colleges in Texas have access to a Tech Prep consortium office, and Tech Prep programs and consortium services are available to all interested institutions. A state policy of 'no artificial boundaries' allows any college in Texas the opportunity to offer articulated programs in conjunction with any public school across the state. Tech Prep programs target the traditional non-four-year college bound student, but are available to, and offer high standards of achievement for *all students*. Comprehensive career guidance and counseling, and student support services, assist in selection of, and success in, a career major.

Tech Prep is locally designed and implemented. Each consortium designs its own unique delivery plan based on regional economic needs, and each program targeted for Tech Prep is identified using current labor market information provided by state and regional labor market analysts. Professional development is provided and/or coordinated by consortium staff to make sure teachers, counselors, administrators, and others, have the skills they need to be effective.

Tech Prep provides for a seamless, lifelong learning opportunity. Tech Prep programs offer a smooth transition between high schools, colleges, apprenticeships, and universities, by developing and implementing non-duplicative curricula that are relevant to life and work. Tech Prep programs emphasize development of skills that are useful throughout life.

Tech Prep programs are measurable and accountable for short and long-term results. Tech Prep programs are positioned to fully participate in student achievement, follow-up, and employer satisfaction studies conducted regionally and statewide.

Planning Regions and Tech Prep Consortia. Each Tech Prep consortium is organized and developed individually, displaying unique responses to local and regional geographic, demographic, and economic needs, while operating within a framework of state and federal guidelines. At least one Tech Prep consortium is closely associated with each of the Governor's 24 planning regions, although consortial partnerships extend beyond these regional boundaries.

The planning region organization provides a base for obtaining regional labor market information, and provides boundaries used for distribution of consortium funds to schools and colleges. Program articulations and consortium services operate without regard to these boundaries.

Twenty-one of 24 planning regions (88 percent) have colleges within the region that offer state-approved Tech Prep programs outside of the region, with independent school districts in 23 of 24 planning regions (96 percent).

This cross-regional and cross-consortial articulation, actively encouraged by the state's tri-agency partnership, enhances student transfer and contributes to the development of a comprehensive statewide system of educational programs. Almost 150 independent school districts in 89 Texas counties are involved in this cross-boundary program articulation.

Contributions of Tech Prep to Sustainable Education Reform in Texas. Tech Prep program development efforts in each planning region have resulted in numerous statewide contributions to the work force education process. These include:

Adoption of joint guidelines. The Texas Higher Education Coordinating Board and the Texas Education Agency adopted joint guidelines for Tech Prep program approval that provide for local flexibility within a basic state framework of program standards.

Degree and certificate designation. The Texas Higher Education Coordinating Board approved the Tech Prep designation for associate degree and apprenticeship programs, and officially recognized the enhanced skills certificate as a new credential.

Recommended high school program. The State Board of Education recognized Tech Prep as one option in the recommended high school program of study, and included Tech Prep as one possible avenue to earn a high school distinguished achievement award.

Texas Scholars Program. The Texas Business and Education Coalition adopted the Tech Prep graduation option as one method to achieve recognition under the Texas Scholars Program.

Student identification. The Texas Education Agency assigned a Tech Prep student identification code for the PEIMS data collection system, and provided a standard definition of a Tech Prep student. This code, and the Texas Higher Education Coordinating Board's student identification code, will assist in assessment of student achievement and follow-up through the Student and Adult Learner Follow-up System (of the State Occupational Information Coordinating Committee.)

Transcript code. The Texas Education Agency adopted a code for high school transcripts that identifies articulated courses to enhance the transfer of articulated credit to community and technical colleges statewide.

Course catalogs. Tech Prep programs, and other methods of receiving articulated course credit, are regularly described in course catalogs of independent school districts and colleges across the state.

Career pathways. The Career and Technology Division of the Texas Education Agency included Tech Prep career pathways in the standard application for federal vocational education funds.

State Agency Management. The state's tri-agency management structure for quality work force planning was expanded for Tech Prep. Although the Texas Higher Education Coordinating Board serves as fiscal agent for all federal Tech Prep funds, all state-level policy decisions for the development of Tech Prep were coordinated by representatives of all three agencies.

There are currently three FTE's supported by Tech Prep funds at the Texas Higher Education Coordinating Board, and contracts with the Texas Education Agency and the Texas Department of Commerce have provided financial support for Tech Prep staff at these agencies.

Consortium Governance and Organization. Tech Prep consortia are governed by boards composed of representatives from both the public and private sectors reflecting the grass-roots nature of the initiative. The over 660 total members represented on the 1995-1996 governing boards of Tech Prep consortia represent only a fraction of the thousands of regional representatives who have worked to implement Tech Prep processes and programs across the state. The majority of Tech Prep consortium federal grants in Texas (84 percent) are managed by community and technical colleges; the remainder are managed by universities, a council of governments, and a private industry council. Tech Prep consortia operate with minimal staff, averaging two professional and one support staff per consortium. Statewide totals are 49.5 FTE professional staff and 28.8 FTE support staff. Professional staff act as field agents, providing technical assistance, professional staff development, curriculum development assistance, program marketing, and other services to member institutions, in addition to administrative duties. Statewide, 41 percent of governing board members represents business, industry, and labor, and 43 percent represents public schools, community and technical colleges, universities, and other educational institutions. 16 percent of governing board members, designated as "other", represents such diverse groups as parents and students, state and local government, quality work force planning committees, private industry councils, councils of governments, and community-based organizations.

History of Tech Prep Federal Funding. Tech Prep courses and programs are funded with state and local funds. Although the primary source of funds for Tech Prep consortium activities, services, and staff is federal, Tech Prep programs are developed and implemented because of the ability of consortium members to leverage local, state, and additional federal funds to improve existing programs and to develop new educational opportunities for Texas' students.

Tech Prep consortia also receive financial support from contributions such as: donated housing, meeting space, utilities, and services; in-kind contributions which include use of institutional funds to support program and professional development; and cash donations.

Approximately eight percent of all federal Tech Prep funds allocated to the state of Texas (federal fiscal years 1992-1996) was allocated for supplemental grant projects to support statewide collaboration and decrease duplication of efforts among consortia. Just over three percent of these funds were allocated for state administration.

During the same period, over 88 percent of all Tech Prep funds went directly to Tech Prep consortia. Services and activities provided by Tech Prep consortia include serving as liaison among all partners, and providing technical assistance; coordinating program and curriculum development; coordinating and delivering professional development activities for all sectors; developing, printing, and distributing marketing

Federal Program Year(s)		Submitted	Funded	Total Award	Average Award		Effective Dates	
1991-1992 Planning RFP	3/28/91	23	20	$997,028	$49,851		1-Jul-91	28-Feb-92
Implementation RFP	10/30/91	25	18	$3,550,000	$197,222		15-Jan-92	30-Jun-92
1992-1993 (Continuation)			18	$8,438,667	$398,941	*	1-Jul-92	30-Jun-93
Inital Implementation			7		$179,676			
1993-1994 (Continuation)			25	$8,151,820	$326,073	*	1-Jul-93	30-Jun-94
1994-1995 (Continuation)			25	$7,773,788	$310,952	*	1-Jul-94	30-Jun-95
1995-1996 (Continuation)			25	$7,517,958	$300,718	*	1-Jul-95	30-Jun-96
1992-1996				$36,209,242	Total State Allocation			
1992-1995				$27,192,179	Total State Expenditures			

* amount includes prior years' carryover funds

and recruitment materials; providing career awareness, guidance, and counseling services and materials; providing funds for equipment, materials, and supplies for new and existing programs; monitoring and evaluating programs and student achievement; and providing assistance in the integration of academic and technical learning.

An average of 45 percent of all consortium expenditures was for direct allocations to, and services for, consortium member institutions.[1] Direct allocations and services include subgrants to independent school districts and colleges for equipment, materials, and supplies; curriculum development; professional development; consortium member travel; career guidance/counseling; and student support services.

Other allocations include:

38%	field and support staff salaries and benefits;
5%	consortium office operating expenses;
5%	fiscal agent's indirect costs;
4%	printing and marketing; and
3%	staff travel.

Tech Prep: Effective Use of Federal Tech Prep Funds. In addition to the cost savings offered to Texas' college students through course articulations in Tech Prep programs and less need for academic remediation, Tech Prep has offered comprehensive services to regional institutions and organizations at a very low rate.

This cost effectiveness can be illustrated by the average federal Tech Prep expenditure per public school student per year, and per independent school district per year. For example, Tech Prep funds expended in all 25 consortia totaled $24,447,809 for federal fiscal years 1992-1995, averaging $244,478 per consortium per year for four years.[2] The average Tech Prep federal expenditure for delivering Tech Prep opportunities and services was $6,387 per independent school district per year for four years.[3] The average Tech Prep federal expenditure for delivering Tech Prep opportunities and services was $1.70 per student per year for four years.[4]

---

[1] *(Based on the average of the 94-95 FFY expenditures, 13 of 25 consortia reporting. Average 94-95 total expenditure - $333,322 per consortium)*

[2] *(Note: 7 consortia expended funds for only three years)*

[3] *(Calculation based on 957 independent school districts with high schools.)*

Tech Prep Educational Programs. Tech Prep programs consist of a six-to-eight year plan of study, much like a college major, that begins in the ninth grade. Comprehensive career guidance and counseling assists students in the selection of the major. After introductory classes, a four-year technical core begins in the eleventh grade and concludes after two years of postsecondary education at a community or technical college, private proprietary school, or postsecondary apprenticeship. Many programs have options for baccalaureate-level and advanced study.

College-preparatory academic courses are taken in grades 9-12 that directly support the high school technical curriculum and which prepare the student for success in postsecondary education. Higher-level academic courses follow at the postsecondary level. The programs emphasize competency-based curricula, with integrated academic, technical, and workplace skills.

College and/or apprenticeship credit may be earned by the student while in high school, most commonly through the process of course and/or program articulation. Students may also earn course credit by concurrent enrollment or credit-by-exam.

Based on information provided by state and regional labor market analysts, Tech Prep programs are developed to provide employees for targeted occupations and industries in areas where high-skill, high-wage employment is available in the region, balanced by the ability of individual school districts and colleges to equip and operate a specific program.

Statewide, 378 distinct Tech Prep programs have been developed in 17 major occupational program areas. These programs offer a total of 551 associate of applied science degree awards, three associate of occupational studies degree awards, one registered apprenticeship, 544 certificate exit point awards, and 449 enhanced skills certificate awards.

State-approved Tech Prep programs are located in 224 of the 252 Texas counties (88.9 percent) with independent school districts.

Over 91 percent of all public two-year postsecondary institutions offer state-approved Tech Prep programs. These institutions include 45 of the 50 community colleges and community college districts, all three campuses of the Texas State Technical College, and all three public, lower-division postsecondary institutions. Each of the 51 postsecondary institutions that offers state-approved Tech Prep programs offers multiple program options.

---

[4] *(Calculation based on a K-12 enrollment of 3,585,112 students, 1993-1994 school year, in these same school districts.)*

Approvals of Tech Prep programs at a state university, a proprietary institution, and with a registered, postsecondary apprenticeship signal expansion of Tech Prep program articulation in Texas beyond public community and technical colleges.

Of Texas' 957 independent school districts with high schools, 643 (67 percent) offer at least one Tech Prep program. There are over 2,900 Tech Prep postsecondary program options available statewide for Texas' high school students. Of the 643 school districts with state-approved Tech Prep programs, 517 (over 80 percent) offer multiple articulation options for their students. 202 of these districts (over 31 percent) offer Tech Prep program articulation options with multiple colleges, often in more than one planning region.

Postsecondary Tech Prep Student Enrollments

(includes alternate-entry students, as well as Tech Prep high school graduates)

Fall 1993	(Certified)	8,529
Fall 1994	(Certified)	25,089
Fall 1995	(Preliminary)	45,858

Secondary Tech Prep Student Enrollments

1993-1994		11,398
1994-1995	(42.7% of Tech Prep school districts reporting)	25,956
1995-1996	(Preliminary)	56,821

ISDs with State-Approved Tech Prep Programs by Community Type

Community Type	ISD's with High Schools	% With Tech Prep
Major Urban	9	100.0
Major Suburban	65	95.4
Other Central City	25	100.0
Other Central City/Suburban	80	81.3
Independent Town	74	85.1
Non-Metro: Fast Growing	91	57.9
Non-Metro: Stable	236	73.3
Rural	377	51.5

1993-1994 ISD classifications (as of March, 1996)

Tech Prep Program Model

Grades 9-12

- career guidance and counseling
- selection of career major
- recommended high school program
- academic and technical integration
- articulated courses
- student competence evaluation
- workplace skill development
- external work experiences

Entry level

Alternate entry for:

- non-Tech Prep high school graduates
- GED recipients & high school drop-outs
- returning adults and displaced workers
- leveling courses
- basic and academic workplace skills
- exams for course credit
- credit for work experience

Preparatory

Community & Technical colleges

- associate degrees
- articulated courses
- enhanced skills certificates
- apprenticeships
- workplace skill development
- external work experiences

Technical Level

Proprietary institutions

- basic academic skills
- associate degrees
- workplace skill development

Technical level

Four-year colleges and universities

- baccalaureate degrees
- advanced and professional degrees

Professional level

BUSINESS AND INDUSTRY

Apprenticeships EMPLOYMENT

Registered and non-union

Tech Prep consortial partnerships have provided access to Tech Prep programs to even the smallest, most remote schools in Texas. Of the 260 independent school districts with high schools classified as rural with total district enrollments of less than 500, 125 (48 percent) offer Tech Prep programs for their students in 11 different program areas, and 90 (almost 35 percent) offer multiple articulation options.

ISDs with State-Approved Tech Prep Programs by Total Enrollment

Enrollment	ISD's with High Schools	% with Tech Prep
> 50,000	7	100.0
25,000 - 49,999	22	95.2
10,000 - 24,999	48	97.9
5,000 - 9,999	62	88.9
3,000 - 4,999	77	91.0
1,600 - 2,999	136	75.4
1,000 - 1,599	118	63.9
500 - 999	195	61.9
< 500	292	49.7

1993-1994 school year enrollments (as of March, 1996)

Impact of Consortium-Sponsored Activities. The impact of the numerous Tech Prep consortium-sponsored professional development, curriculum development, and content integration activities is widespread. Preliminary indication of the influence of these Tech Prep processes on classroom instruction is demonstrated by surveys of independent school districts in eight representative Tech Prep consortia. The results indicate a substantial increase in the number of academic courses, including mathematics, physics, physical science, biology, chemistry, and English, taught using methods that emphasize applications of traditional academic content. In the school districts surveyed, these course sections increased from a total of 831 in the fall of 1990 to 4,004 in the fall of 1995.

In summary, the impact of Tech Prep implementation in Texas is significant. Tech Prep consortia in Texas provide services across regional boundaries, independent school districts articulate with multiple colleges in multiple regions, and community and technical colleges articulate with multiple independent school districts in and out of the associated planning region.

Resources

Average expenditure per student per year and per school district per year - *based on the total ISD enrollments (K-12) for all districts in the region with high schools (1993-1994 school year), and the total federal fiscal years (FFY) 1992-1995 federal Tech Prep consortium expenditures divided by the total number of years for which funds were expended.*

College participation in state-approved Tech Prep programs and program areas by CIP codes - *from the Education and Training Clearinghouse Tech Prep program inventory, Texas Higher Education Coordinating Board, as of March 3, 1996, and/or verified by college personnel. Grouped according to the Classification of Instructional Programs (CIP), 1990 edition, US Dept. of Education. Data for community college districts with multiple FICE code campuses are combined.*

College preliminary Fall 1995 headcount - *provided by the Texas Higher Education Coordinating Board (headcount as of October, 1995.)*

Consortium staff information - *provided by the Tech Prep directors and the Texas Higher Education Coordinating Board.*

County populations - *from the 1993 annual estimate of the Texas Department of Commerce, State Data Center; 1993 represents approximate mid-cycle figures for federal fiscal years 1991-1996.*

Estimated Fall 1995 secondary & postsecondary student enrollments - *in Tech Prep programs; from 1995-1996 Tech Prep consortium first quarter reports and/or the Fall 1995 Inventory of Local Tech Prep Planning and Implementation, Mathematica Policy Research, Inc., compiled for the national evaluation of Tech Prep, US Department of Education. Postsecondary includes students from Tech Prep high school programs as well as students entering the associate degree program by alternate methods, and/or students enrolling in certificate programs only.*

Federal grant awards and expenditures, fiscal agents, and budget details federal fiscal years 1992 - 1996 - *from the Texas Higher Education Coordinating Board; total awards include prior years' carryover funds and/or additional allocations, if applicable. The federal fiscal year (FFY) is July 1 - June 30.*

Governing board membership and chair - *from the 1995-1996 Tech Prep consortium reapplications and/or the Fall 1995 Inventory of Local Tech Prep Planning and Implementation, Mathematica Policy Research, Inc., compiled for the national evaluation of Tech Prep, US Department of Education; rounded to 100 percent.*

Impact of Tech Prep program development on high school course content integration - *from responses to a survey of independent school* *districts with state-approved Tech Prep programs in 8 representative Tech Prep consortia (Alamo, Brazos Valley, Capital Area, Lower Rio Grande Valley, North, North Central, Upper Rio Grande Valley, and West Central Texas.)*

Increase in articulation agreements and participating high schools - *from responses to a survey of community and technical college technical education administrators, with assistance from the Texas Association of College Technical Educators (TACTE), or the Tech Prep consortium directors. Articulation agreements may be program and/or individual course articulations. High school participation is duplicate as high schools may participate in articulation with multiple colleges. Increase represents all colleges reporting. Data for community college districts with multiple FICE code campuses have been combined.*

ISD enrollments - *from Snapshot '94: 1993 - 1994 School District Profiles, Texas Education Agency, Division of Performance Reporting.*

ISD participation by community type and enrollments - *in state-approved Tech Prep programs; from the 1994 - 1995 Public Education Information Management System (PEIMS) data, Texas Education Agency, Division of Technology Support.*

ISD participation by county and program areas - *in state-approved Tech Prep programs; from the Education and Training Clearinghouse Tech Prep program inventory, Texas Higher Education Coordinating Board, as of March 3, 1996, and/or verified by college or consortium personnel.*

Planning region size - *based on the Governor's 24 planning regions and county square mileage as determined by the census bureau, 1990.*

Process for receiving articulated credit - *from responses to a survey of community and technical college technical education administrators with assistance from the Texas Association of College Technical Educators (TACTE). (Method cited is in addition to regular college admissions requirements.)*

Regional highlights and consortium products - *from 1995-1996 consortium first quarter reports, and interviews with Tech Prep consortium directors and staffs.*

Secondary enrollments in approved Tech Prep programs - *from the Public Education Information Management System (PEIMS) data, Texas Education Agency, Division of Technology Support.*

THE TECH PREP CONSORTIUM DIRECTORS: THE ARCHITECTS FOR THE FUTURE OF TEXAS

by
Oliver D. Hensley, Ronald Opp,
and Pamela Ann Cooper
SPECAP
College of Education
Texas Tech University
Box 41071
Lubbock, TX 79409-1071
(806) 742-2329

Innovative, creative, and dedicated to the philosophy and mission of Tech Prep programs, the individual Tech Prep Consortium (TPC) directors have exhibited a total commitment to fulfilling the charge of advancing technical education in their regions, and collectively, they have improved the Texas educational enterprise. After two years of researching Tech Prep programs in Texas, we strongly believe that the TPC directors serve as the architects of the future of Texas. They have become the models for present and future educational leaders and serve as the leaders of strategic planning for regional education and economic development in Texas.

The authors believe that the future will be shaped by what has been taught to today's youth. If the premise is true, tomorrow, Texas will have a competent technical workforce prepared by the educators of today. This technical workforce will allow Texas to compete in the technology-dominated world of the 21st century.

The Tech Prep directors are the leaders in developing new educational options and strengthening existing programs across the state of Texas. They are showing other educators, by example, how to work together to share resources, develop articulation agreements, set quality standards, promote alternatives, and advance the common cause of better education for Texas citizens.

We also believe that the TPC directors are a different breed of educational leader. They are not planted in one sector of society. They are leaders in the industrial, governmental, and non-profit sectors. They are the *sine qua non* in coordinating the planning and implementation of Tech Prep activities in their regions. The Tech Prep consortia have become beacons to innovative educators everywhere. These Tech Prep beacons are tended diligently by TPC directors, prototypes for this threshold decade and the 21st century.

The authors are the principal investigators for SPECAP, an externally funded, Texas Tech University project designed to assess Strategic Planning, Evaluation of Curriculum, and Assessment of Performance (SPECAP) of the Tech Prep consortia and their associates. In a very thorough document analysis, SPECAP investigators have made a comprehensive study of early Tech Prep planning. In 1991, the Texas Higher Education Coordinating Board encouraged Texas community colleges and their local independent school districts to form Tech Prep consortia and to prepare proposals for programs that could be supported by 1992-93 Carl Perkins grants. Community colleges worked with business and industry, their independent school districts, their Quality Work Force Planning committees, and their Councils of Government to prepare proposals for submission to the Texas Higher Education Coordinating Board, the cognizant agency for Tech Prep programs receiving Carl Perkins funds. SPECAP's document analysis led to the creation of a model for Tech Prep planning activities. This model then allowed the investigators to identify essential planning activities proposed by the TPC directors. These innovative proposals included the plans for developing Tech Prep educational systems from October, 1991, through June, 1995. This type of systematic planning did not exist prior to the creation of Tech Prep consortia. Document analyses, surveys, telephone interviews, and student satisfaction questionnaires provided a wide range of evidence that the proposed Tech Prep programs brought to fruition the vision of the Carl Perkins Act. All education in Texas has greatly benefited from the careful planning and implementation of Tech Prep programs.

Analysis of Tech Prep 1992-93 implementation proposals, questionnaires, telephone interviews, and student satisfaction questionnaires have shown that the consortia are achieving what they proposed to accomplish. Moreover, SPECAP's comprehensive analyses show that the Tech Prep consortia are reforming education in its entirety by creating successful illustrations of cooperative planning, enhancement of curriculum, and rigorous assessment of performance.

Tech Prep consortia are articulating the efforts of a very fragmented enterprise. The consortia continue to promote the independence of local units, while creating specific partnerships that require intense cooperation. After five years of operation, the consortia are perceived by students, parents, teachers, principals, government representatives, and business leaders as the change agents needed to introduce and institutionalize much needed educational innovation in the highly independent systems of the state. The authors believe that the leadership for this dramatic change in Texas education comes directly from the Tech Prep consortia directors.

The first model we shall consider is shown in Figure 1 -- the Strategic Planning Impact Areas. This model is a holistic approach to planning for Tech Prep development. Successful TPC directors recognize that their strategies will be enhanced by individuals and institutions from some quarters and, in turn, that their plans will significantly impact other quarters. Consequently, the first part of any analysis of strategic planning requires the identification of all the sectors that will contribute to Tech Prep program development and all sectors that will be impacted by Tech Prep. We have identified the following areas, shown in Figure (1).

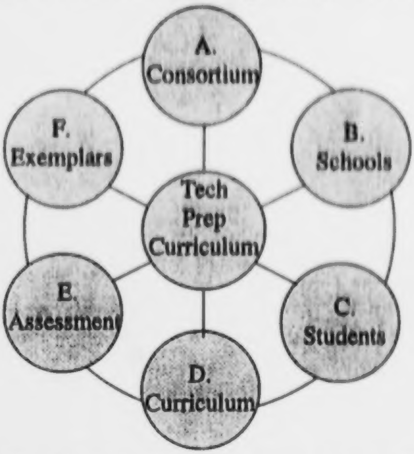


Figure (1). The Strategic Planning Impact Areas of Tech Prep.

Impacts on Texas Education. SPECAP investigations have identified the following main impacts on Texas Education.

Tech Prep Consortia: Exemplars for Solving Critical Education Problems. The Tech Prep consortia and their directors are vital to education and the economy. Across the state, these new, potent change agents have cemented historically fragmented social sectors into unified associates that have institutionalized carefully planned agreements. The planning, formation, and operation of the 25 Texas Tech Prep consortia provide proof that previously separate and diverse sectors in a region can come together to plan and implement educational innovations that benefit the student, industry, local communities, the state, and the nation.

BEST COPY AVAILABLE

The Target Schools: Hosts for Tech Prep Experimentation and Innovation. The TPC directors were instrumental in developing target schools that created articulated programs where college begins before high school ends. At this level, the partnerships between education, business, and government entities are visible, active, and productive. These programs include multiple entry and exit points for both traditional and adult students.

Tech Prep Students: The Right Citizens for Critical Times. The TPC directors created hundreds of Tech Prep programs to prepare competent, skilled individuals to contribute significantly to the advancement of citizenship and the prosperity of the nation. On a more tangible level, the Tech Prep students are prepared for careers in well-paying jobs that will increase pride in their work and enhance personal satisfaction.

The Tech Prep Curriculum: New Options/Opportunities for the Majority of Americans. The future belongs to those who prepare for it. The TPC directors have been the architects for a wide range of new Tech Prep programs that offer a new kind of education in an ever expanding array of occupations. Each year new programs are added to the existing curriculum, and the curriculum is changing from a theoretical and purely academic orientation to a practical and applied orientation. Programs become more expansive as formerly fragmented sectors join forces to establish a unified, holistic system. This cohesion could not have occurred without the planning and implementation leadership of the TPC directors.

Performance Assessment: Establishing Productivity Measures and Quality Standards. Sponsors are keenly aware that Tech Prep is highly effective and graciously acknowledge the many contributions of the TPC directors who help plan and develop their future workforce. The SPECAP investigators gathered evidence to establish the fact that the sponsors' investment in technical education is well spent, beneficial to local industry, and will be the foundation for regional economic development.

The Tech Prep Directors' Association of Texas. The Texas TPC directors have created their own professional association to further their mission. The Directors' Association hosts an annual State Tech Prep Conference. The response to the conference from the stakeholders is positive with attendance growing every year, with more than 1500 registrants in 1996. The conference is one of the many tools used by the TPC directors to plan the future of Tech Prep education, establishing a solid foundation for a quality workforce in Texas.

The National Tech Prep Network. Nationally, the Texas TPC directors have been very active in leading the development of Tech Prep education. The Texas TPC directors have been recognized for their strong leadership efforts to advance a national agenda that would enhance Tech

Prep programs. In 1996, the National Tech Prep Network conference was held in San Antonio, Texas, with Debra Nicholas, TPC director for Alamo Tech Prep Consortium, serving as the "official liaison" to the National Tech Prep Network Conference. Debra Nicholas's offer to assist as a "host consortium" is typical of the facilitative attitude of the TPC directors in doing their part to further any activity that advances Tech Prep.

Tech Prep Strategic Planning. The Tech Prep initiative has, for the first time, created a comprehensive series of regional consortia in Texas that have brought the education, government, industry, and labor sectors together for the express purpose of improving education in their regions. These consortia are exemplary organizations in our society. Their influence reaches far beyond the educational enterprise and extends into business, industry, and government. The resultant interaction causes all sectors to reconsider their planning, policies, and practices so that common, long-term goals of the community can be achieved.

Tech Prep directors emerge as facilitators for introducing Tech Prep programs and educational innovations. Furthermore, the consortia staff are bringing the Tech Prep associates together to implement a wide variety of innovative and new programs. The Tech Prep planning processes have impacted the partners' internal planning and operations. SPECAP analyses show that, in these ways, the director and their advisory councils are planning the educational future for Texas.

The consortia have drawn heavily from the Quality Work Force Planning Committees (QWFPC) and from the expertise offered by business and industry in creating their strategic plans. The secondary schools have followed the lead of the consortia and have introduced strategic planning in their own institutions. Similarly, business, labor, and government have seen the success of the consortia' cooperative, long-range planning with their partners. The impact of the consortia on regional planning and institutional operations has been profound and positive.

The SPECAP comprehensive analyses have found that Tech Prep planning lead by TPC directors has had a direct, profound, and positive impact on Texas education, and that these plans are contributing significantly to advancing the economic development of the State by providing a competent and technically-educated workforce for Texas industry. Equally important is the fact that the Tech Prep consortia are providing exemplary leadership in cooperative planning and implementation of educational reforms. The consortia are exemplary organizations that, by the success of their activities, have merited emulation and have gained widespread community support for previously unattainable reforms. Indeed, the TPC directors are the prototype for the educators of the 21st century and the architects of the future of Texas.

TECH PREP: JEWEL IN THE CROWN

by
Douglas L. Pickle
Professor and Division Chair of Industrial Technology
Amarillo College
P.O. Box 447
Amarillo, TX 79178-0001
(806) 354-6001

As most of us know, Tech Prep is a success in every aspect of education. Students, parents, teachers, administrators, public and postsecondary institutions, and business and industry have launched into a new era of education that truly exemplifies partnerships. Students are the recipients of thoughtful, educational planning that includes the integration of general educational skills into advanced technology requirements. The heart of this plan focuses on the middle 50 percent of the student population that is not educationally gifted or in need of extra assistance. Tech Prep provides students a plan for the future that will help them be lifelong learners with continued success throughout their professional and personal lives.

In the Panhandle of Texas (sometimes referred to as the Crown of Texas), high technology companies are as sparse as the trees. Blending the private sector with education sometimes involves mixing distance with diplomacy. Business and industry's response to Tech Prep was outstanding and included major players on both sides to establish the partnership. Cooperation through partnerships was the key to success.

The Plan. The plan sets forth a six-year course of study that was aggressive in promoting the academic skills necessary for completion of the highly technical courses. The student's goal in this plan was to complete as many as 12 hours of college-level technical courses while in high school. In order to assist in the completion of this goal, teachers from local independent school districts came together with their counterpart instructors from the local community colleges. Technicians from business and industry joined educators to determine and verify workplace competencies and performance skills to be completed by the student. The result was a comprehensive competency profile that included SCANS requirements, but could work both in secondary and post-secondary institutions. The plan began in the ninth grade and continued through the freshman and sophomore years at the community college, culminating in the Associates of Applied Science degree. The competencies, earned at the high school level, were applied toward the 12 semester hours that the student carried on to the community college's technical program, with no duplication of effort on the part of the student. It not only allowed the student to complete the technical program in a lesser amount of time, but also allowed the student to continue to the next level, an Advanced Skills Certificate.

The technical programs selected for the Tech Prep program were as traditional as Drafting and as up-to-date as Environmental Health Technology. The high school courses were updated from the 16 essential elements to include the competencies that were needed for the freshman level technical program. Care was taken to ensure that the student would train on equivalent industrial-grade equipment at both institutions. Course content was developed in a Competency Based Instructional (CBI) format that was adaptable enough to be taught at the high school and community college levels. Care was also taken to ensure that no course or competency completed at the high school level would be duplicated or tested for at the accepting community college. A bridge program was developed for students who entered the program at the community college to compensate for the 12 hours that Tech Prep students had completed at the high school level. This allowed the Tech Prep student to be mainlined with students at the community college. At the root of all the courses were the SCANS requirements. Each course was developed ensuring that most competencies were met in individual classes and all were met in the 12 semester hours that were granted for credit.

Most community colleges guarantee their graduate's technical competencies for their future employers. This guarantee simply ensures the employer that the student has the basic technical skills to do the job and if the student does not perform them correctly, the institution will retrain the employee (former student) at no additional cost to the student or employer. This guarantee places a high premium on quality instruction and a sound educational system. It also forces the Tech Prep courses to be technically competent, and instructors educationally sound. Instructors have to be interchangeable. In the Automotive Technology program, for example, an instructor exchange system, allowing instructors to have both experiences, is under development. This is another step in making education seamless for the student, with transition into the world of work.

The Student. For the student, Tech Prep offers numerous options and career exit points. One of the more intriguing aspects of this educational plan is the targeted audience. The intended student for this program is the middle 50 percent of the student population. These students traditionally make average grades, and take only the courses necessary to graduate from high school with little or no ambition to continue their education. Because they just get by, the middle 50 percent are the ones educators frequently forget. Sometimes, motivating these students can be difficult or hopeless. Generally, they are not concerned about their education, completing only the minimum requirements in general education to get out of school with little or no English, mathematics, or science skills. This is where Tech Prep really fills the bill.

Tech Prep requires a student to go beyond the basics to advanced general education courses to support the technical courses. The student follows a progression of technical and academic courses upon completion of the high school portion, ensuring that they are educationally prepared to complete the remainder of the Associates of Applied Science degree at the community college. When the program is established in an eight-year format, the student may continue toward the Bachelor's of Applied Science degree at articulated colleges and universities.

If a student chooses to go to work, there are several exit points they can choose in order to leave the Tech Prep program with a higher level of pay and/or responsibility. The exit points are High School diploma, Certificate of Completion, Associate of Applied Science degree, and Advanced Skills Certificate. The student receives higher pay than a traditional high school graduate because they have more advanced technical skills. The Certificate of Completion is more than high school but less than the Associates degree. This certificate is concentrated on technical courses and builds upon the 12 hours earned at the high school level. It does lack the general education component of the Associate's degree and some advanced technical courses. This allows the student to receive more pay due to additional technical competencies. The Associate of Applied Science degree allows the student to enter the job market as a technician. The Advanced Certificate allows the student to have advanced technical skills in the form of an extra option to the Associate's degree. The Advanced Certificate has more technical competencies, allowing the student to be more desirable as an employee. Thus, each exit point has specific technical competencies, integrated with general education courses, to produce a more academically and technically competent employee.

Business And Industry. Tech Prep invites advice and collaboration with business and industry. It is from industry that Tech Prep draws its strength and support. Strength from industry as a partner directly influences the curriculum in the technical courses. Industry is regularly surveyed to update the technical competencies of each course. The courses are designed by industry and implemented by technically-competent instructors so that the student has work-based performance competencies that are specific and required to perform the job. The competencies are guaranteed, in writing, by the institution and submitted to the hiring company. Specific competencies are tracked on the student's competency profile chart and are presented to the future employer at the first interview. The competency profile shows the employer the competencies completed, performance level of completion, and the number of tries the student attempted in order to compete the competency. Business and industry know what they are buying when they hire the Tech Prep completers.

Business and industry participants are more than Advisory Committee Members. They serve on curriculum committees to inform educators of the technical and social changes of their jobs and careers. Technical change in the workplace is one of the constant elements that drive technical programs and even more so with Tech Prep. More than just another technical program, Tech Prep can also adjust its general education component to include more of the reading, writing, and mathematical skills that drive technological advancement. Business and industry, working with educators to provide a competent worker with lifelong learning skills, is the essence of Tech Prep.

Tech Prep In The Crown. Tech Prep, in the crown of Texas, is a consortium effort that is comprised of the elements necessary for success. The elements of success -- students, educators, and representatives from business and industry -- are interwoven in a unique format so that each partner plays a specific role in contributing to the overall success of the program. Each independent school district within the Tech Prep consortium service area was contacted and asked to participate in the program with a specific community college and comparable technical program. The Tech Prep director contacted the school districts and began the process of matching high school technical programs to their counterparts in the community colleges. The next step was to locate and involve local business and industry to assist with program development. After the matches were made, meetings were coordinated to get the players to the table. Long hours were spent in developing curricula that would benefit the student and their future employers.

After the curricula were developed, agreements between school districts and community colleges were set in ink and sent to the Texas Higher Education Coordinating Board for approval. Once the approvals were obtained, the real work began. The real job was selling the program to public school teachers, counselors, and most important, students and their parents. Several informational meetings were arranged by the Tech Prep director and staff for students and parents. These meetings went well and got the fires burning. One of the major players in the Tech Prep process is the counselor. These professionals have considerable contact with the students and have the opportunity to assist the student with career choices. It became essential that the counselors understand and participate in the program. The counselors in the public schools have contributed to the success of Tech Prep in the Crown.

Tech Prep, the educational process, has brought about the changes in education that were promised when it was enacted by Congress. Tech Prep changes the way of addressing the problem of making academics work in a technical program, by allowing new technologies, supported by traditional academic courses in a program that rewards the student for doing at-level work, to carry over to the next plateau. Tech Prep in the Crown encourages education to continue from one level to the next without penalizing the student by requiring him to retake courses and resift through information already learned. Rather, Tech Prep encourages the continuation of learning that will enable students to survive in the technological world of the 21st century.

SYNTHESIS OF LITERATURE RELATED TO TECH PREP OUTCOMES

by
Casanda (Cassy) Key
Executive Director
Capital Area Tech Prep/School-to-Work Consortium
5930 Middle Fiskville Road
Austin, Texas 78752
(512) 223-7825

In the pursuit of happiness...

If George Baker is to be believed, 87 percent of U.S. workers spend about half their lives doing something they consider meaningless (1989). It's no wonder productivity is low. Even though the U.S. Constitution guarantees a right to "the pursuit of happiness," few appear to be finding it in the workplace.

T.J. Asklund tells a different story. He considers himself a $15,000-a-year millionaire because he loves his job at Texas Instruments in Austin; however, he had to work to get his current state of bliss.

When T.J. was nine, he and his older brother became partners in a lawn-mowing business. They made good money, but after two years, T.J. got tired of doing something that did not interest him, so he moved on.

T.J. then started working for his dad, who owned a laminated countertop business. The money was good, but as the owner's son, you get to do the jobs no one else wants -- just to prove you are not getting any special favors. So T.J. moved on.

He started doing maintenance and manual labor at a nearby resort. He later moved up to office and accounting work at the resort. Then T.J. realized that unless he learned to communicate well with customers, he would never get into management. So he asked to be moved to the front desk, and although the money was even better at the front desk, he knew he did not want to spend his future there.

On his way to meet his girlfriend for lunch one day, T.J. had thirty minutes to kill. Armed with a career passport from his high school, T.J. went to Texas Instruments (TI). Hopeful. He was ready to move along. They hired T.J. -- in fact, they hired him at one step above entry-level -- only weeks after high school graduation. In high school, T.J. liked art, the principles of technology course, and the college electronics classes offered for college escrow credit. "It was a good deal -- we could take about $300 worth of college courses free." T.J. thought the physics and electronics classes were fun because "you had to think and work at the same time and the problems were work-related."

As it turned out, the head of T.J.'s division at TI had helped design the course of study T.J. had received -- but the two never met until long after T.J. had been hired. Nevertheless, after less than six months at Texas Instruments, T.J. Asklund moved up. Now, after a year and a half at TI, T.J. has been promoted five times and has just enrolled in Austin Community College (Fall semester, 1992).

"It really makes me feel good when someone with a bachelor's degree looks at me after I've solved a problem on the line and says, 'Hey, you really do know what you're doing.' I'm really lucky. TI not only gave me a job, they'll also help me with my college tuition and books. I couldn't afford it without them." T.J.'s expertise has him working on surface mount technology using a Fuji machine. In his spare time, T. J. also enjoys doing a little volunteer work. He's promoting something dear to him called Tech Prep. Why? T.J. says he wants to "give something back to the people who helped me get where I am today -- and help other students like me know they can do it, too."

What is Tech Prep? Tech Prep is a synthesis of several education innovations that preceded it. In a nutshell, it is a plan to link individuals and institutions with similar education aims to produce a better skilled workforce. Tech Prep curricula, designed by teams of educators and employers, is meant for half of the high school population. It teaches marketable skills to help students land jobs in promising career fields. Students exit high school, the community college, or technical school with three options -- higher education, work, or both.

Tech Prep is more than "2+2." It is a lifelong career ladder putting work experiences in tandem with schooling, nurturing mechanisms, and evaluation components. The Tech Prep system dips into the middle school --perhaps even lower. Tech Prep's work component starts with mentioning education, and includes other school-to-work transition mechanisms as the student becomes better educated.

The goal of Tech Prep is to provide the competencies needed for entry into the most marketable jobs available -- highly-skilled occupations that require workers to have a broad academic and technical base in order to be successful lifelong learners. These workers will be retraining and upgrading their occupational skills -- perhaps changing occupations seven to ten times during their 30-year careers. Since the community college or technical school will be doing most of that training, veteran workers may be learning basic academic or advanced technical skills in the Tech Prep systems being put in place throughout the country. The aim of these programs is to provide more emphasis on the career choice process and to upgrade the exit competencies of at least 50 percent of high school students. These students will then move into community college curricula and exit with advanced skills and an associate's degree. These aims will require broad cooperation and collaboration throughout American society.

Although Tech Prep is an education innovation born from secondary-level technical and vocational education, its promise is the renaissance of the U.S. economy. Significantly more than just "business as usual," Tech Prep is being built through consortia of high schools, community colleges, and government and community-based organizations, in concert with business, industry, and labor.

First, Tech Prep is not just a program or a specific curriculum; instead, Tech Prep is a system of activities proven to produce successful students but previously not housed under one umbrella. Tech Prep systems in the middle school include: 1) student assessment which assists with career decision-making; 2) career-awareness instruction for students and their parents; 3) monitoring of student success -- a requirement for worksite-based learning as part of the education plan; and 4) a series of competency-based classes in sequences that lead to both work and college after high school. Tech Prep systems also include an evaluation component that links each academic program to business, industry, and labor and leads to ongoing refinement.

Tech Prep's rigorous and holistic approach to creating a better qualified workforce is housed in the technical/vocational high school/community college/technical school domain. Curricula frameworks integrate and require the mastery of technical and vocational skills as well as mathematics, science, and communication skills. However, mathematics, science, and communications courses are taught differently. Teaching methodology is a hands-on and heads-on format tuned to student learning styles and the Secretary's Commission on Achieving Necessary Skills (SCANS) competencies. Cooperative learning teaches team building. Each student's performance is measured by pencil-and-paper tests and team and skills testing. Course content is rigorous and standards are high.

Tech Prep offers students various incentives: 1) the system nurtures students through assessment, career awareness activities, and counseling while accommodating the needs of special populations (although Tech Prep is not a special populations program); 2) students get to take college courses free while still in high school; 3) students have an opportunity for smoother school-to-work transition since work is tied into the Tech Prep curricula; 4) most program options leave open the opportunity for higher degrees; and 5) the careers offered to Tech Prep graduates boast better salaries and more job security than many other careers -- even many careers that require a bachelor's degree.

By necessity, Tech Prep career options are closely tied to the analysis of labor market information. While long-term job forecasts are next to impossible to achieve in this rapidly transitioning and shifting economy, Tech Prep curricula developers attempt to forecast high-demand occupations at least five years in advance. Business, industry, and labor lead the way in determining which competencies will be taught to freshman high school students and continuing through the associate's degree, sometimes beyond. In this way, a graduate can emerge not only with an associate's degree, which represents state-of-the-art technical training, but also with a core of competencies that paves the way for lifetime career development and higher education.

Are Tech Prep and 2+2 Articulation Really the Same Thing? The forerunner of Tech Prep was simply a curriculum arrangement called 2+2 articulation. Research and a review of the literature suggest that most of the time 2+2 articulation did not work very well. A broad review of the 2+2 articulation phenomenon includes, by necessity, not only 2+2 articulation outcomes, but also forays into the realms of organizational management, communication, change, and the adoption of innovation. A synthesis of research outcomes within these areas suggests that the secret of success to Tech Prep implementation is as holistic as the Tech Prep system itself.

Tech Prep's raison d'être is clear -- America's middle majority workforce must significantly increase its skills. Pushed by a rapid escalation in global competitiveness and declining abilities in the backbone of the workforce, Congress is serious. Congressional appropriations out of the 1990 Carl D. Perkins Vocational and Applied Technology Act were $63.4 million in 1991, which is why, in spite of tightening budgets and a growing national deficit, Tech Prep was allocated $90 million for 1991-1992. This faith in a program just getting off the ground carries with it high expectations for technical and vocational educators.

These are perilous times for students. Among the 97 percent of students who take a vocational course (Wirt, 1991, p. 427), only 27 percent specialize in a vocation, and only one percent select technical occupations (Parnell and Armes 1884, p. 4). Instead, over 40 percent of high school students are enrolled in general education (Parnell, 1985, p. 37). Approximately 13 percent of 17-year-olds are functionally illiterate--in spite of a growing awareness that 45 percent of current jobs and 55 percent of the net new jobs between now and the year 2000 will require some college (Bailey, 1989, p. 12). The success of Tech Prep rests on a paradigm shift with ramifications throughout society; therefore, it will take much more than the hard work of technical and vocational educators to move Tech Prep from a congressional mandate to institutionalization.

Why was the Tech Prep Section Woven into the 1990 Perkins Act? Vocational education grew out of a concern for the human condition and the promises each generation had for the next (Swanson, 1982). Yet the discrepancy between what today's entry-level workers must do and what they can do had been noted in one or more major reports each year, beginning with Boyer's 1983 report for the Carnegie foundation, *High School: A Report on Secondary Education in America.*

In 1984 came Parnell's article, "Five Critical Issues"; Parnell and Ames concept paper, *A Working Degree for America*; and the National Commission on Secondary Vocational Education's "The Unfinished Agenda."

In 1985 came the beginnings of state-level reports as well as Parnell's landmark book touting the benefits of Tech Prep, *The Neglected Majority*. In 1986, the Bureau of Labor Statistics and Office of Economic Growth and Employment published *Projections 2000.* In 1987, the Southern Regional Education Board published *Progress Report and Recommendations on Educational Improvements,* while Johnston and Packer's *Workforce 2000* and Berryman's studies and policy papers form the National Center on Education and Training, both of which were predication higher-level skills new jobs would require.

In 1988 Berryman continued to point out the higher-level skills new jobs required. She was joined by a chorus, including One America, Inc.'s final report, *Case Studies in Technology-Oriented Job Preparation*; the Grant Foundation's *The Forgotten Half: Non-College Youth in America*; Cox's study of vocational education for the Research Triangle Institute; the U.S. Department of Labor, Education, and Commerce's joint study, *Building a Quality Workforce; the International Technology Education Association's Technology: A National Imperative*; and Parnell's treatise *The Role of the Community College in Shaping the Nation*.

In 1989, reports such as Daggett and Kadamus's "New Directions for Vocational Education at the Secondary Level" began popping up both at the state and national levels (Parnell and Ponitz, 1989). Even President George Bush began to emphasize education (remarks at the American Success Awards Ceremony, 11 September 1989), and Secretary of Labor Elizabeth Dole and U.S. Representative Jack Jennings began to push the notion of preparing the nation's workforce through vocational education. At the same time, Natriello was publishing a study of rising employer expectations, and Wirt et al. were publishing *A Summary of Findings and Recommendations: National Assessment of Vocational Education*, which concluded that vocational educators had a long way to go to meet those rising standards.

By 1990, almost everyone agreed about the gap. The Commission on the Skills of the American Workforce published *America's Choice: High Skills or Low Wages*, and the Association of Community College Trustees advocated moves to make the major changes necessary to revitalize the economy. States took action. For example, Texas began a joint initiative involving the Texas Education Agency, the Texas Higher Education Coordinating Board, and the Department of Commerce -- Quality Work Force Planning. Even the nation acted through the Department of Education's National Goals for Education.

In 1991, vocational education and workforce development, long relegated to back-door, blue-collar status in the academic community, made it to the living room at last. The editors of *Phi Delta Kappan* targeted a special February issue to the Carl D. Perkins Vocational and Applied Technology Act. Technology education, with Tech Prep systems acting as the change agent, had become a national imperative. Ironically, this turnaround comes at a time when vocational education enrollments are suffering widespread decline (Gray, 1991, p. 437).

There are 4.3 million vocational education students in the United States (Rosenstock, 1991, p. 434), and as Vaughan (1991, p. 447) observed, "We are creating an educational meritocracy in which education and training are the only paths to economic success." Yet only 7 percent of 17-year-olds can handle college-level science, only 6 percent can do the math, and closer to 5 percent are capable of college-level reading (Hart, 1989, p. 238). Although global competitiveness has created a modern-day gold rush to modernize and increase enrollments in technical and vocational education, "mobilization" must occur first. That's where Tech Prep systems enter the picture, pick and pan in hand.

What Investigations Have Implications for Tech Prep Systems? Tech Prep related studies include the topics of 2+2 articulation, the integration of academic and technical education, the success or failure of technical and vocational programs, maximization of the change process, the adoption of change in education environments, student outcomes in 2+2 articulation programs, curriculum development, employee success factors, institutional effectiveness, and the facilitation of communication, as well as organizational, leadership, and economic development practices.

A partial list of these studies includes Lewin 1951; Argyris 1964; Bennis and Nanus 1985; Scott 1985; Naylor 1986; Carnevale, Gainer, and Meltzer 1988; Leaken 1988; Van Allen 1988; and Cutright and Martorana 1989.

What does Research Suggest about Tech Prep Systems? Although 2+2 articulation and Tech Prep are not the same thing, much can be learned from 2+2 articulation program outcomes and other related findings which can help ensure Tech Prep success. For instance, research about state-of-the-art technical and vocational education shows holistic student development aims (Copa, 1985). Tech Prep students will need a strong system of support services (Ames and Elsner, 1983; Cowell, 1988; McKinney, 1988). Given sufficient student services and support systems, articulated programs were of great benefit to students and employers (Arnold, 1987). As VanAllen (1988, p. 18) explained,

> *"if properly designed, 2+2 programs can provide maximum continuity of instruction within and between educational institutions. The end product is a highly specialized and employable . . . technician. The . . . possibilities are only limited by educational resources and employment trends."*

Tech Prep systems incorporate such services into the overall plan.

Program survival, however, appears to be tricky. By 1976, the National Advisory Council on Vocational Education found evidence of "planned articulation in slightly less than 40 percent of the states"(Long et al., 1986, p. 2). As Long and his team pointed out, growing interest in articulation was evidenced by the increased attention given the subject in research, program reports, and position papers.

Mabry's (1988) ERIC overview concluded that the following were essential ingredients in top-notch articulation programs (see Warmbrod and Long, 1986; Parnell, 1985; Long et al., 1986; Fadale and Winter, 1987; Arnold, 1987):

- Leadership from all top administrators.
- Involvement of high school and college faculty from the first stages of planning.
- Recognition and rewards for key participants.
- Relationships built on trust and respect which resist the tendency toward "turfism."
- Clear benefits to all parties.
- Formal, written agreements signed by all chief executive officers. Open, frequent, and clear communication (including counselors and constituents).
- Competency-based curricula.
- Shared vision.
- Modest initial goals and openness to change.

McKinney's (1988) study of articulation, which included a literature review, questionnaires to 482 institutions, and visits to five exemplary sites, went deeper than earlier reports. McKinney's report suggested that: 1) institutional personnel had to exhibit "team leadership" on a continuing basis; 2) local leadership was more effective than state-level leadership; 3) student services such as remediation and transportation services should be provided; 4) programs should be promoted through students, teachers, and counselors; 5) program coordination should not favor one institution over another; 6) an individual should be employed full-time to coordinate consortium activities; and 7) each institution should designate an individual as the 2+2 coordinator.

McKinney (1988) also promoted the notions of formative and summative evaluation, shared facilities and equipment among institutions, and active youth organization involvement. Other recommendations by McKinney indicated that implementors should:

- Allow stakeholders to jointly develop goals.
- Have realistic goals.
- Construct the strategic plan and program evaluation processes using a team of stakeholders.
- Show strong commitment from governing boards, chief executive officers, managers, teachers, counselors, and other staff.
- Ensure that stakeholders are committed to overcoming barriers to effectiveness and efficiency.
- Have regular meetings of all stakeholders.
- Maintain a continuous flow of information to stakeholders and to students.
- Engage in staff development.
- Construct clear communication channels and designate responsibilities.
- Share facilities and equipment when the commute is not a problem.
- Encourage staff visits to exemplary programs.
- Let current students mentor prospective incoming students.
- Utilize program alumni in recruiting and informing others about the program.
- Have regular meetings among vocational, academic, and secondary/postsecondary teachers.
- Focus on improved educational programs and services rather than "turfism."
- Develop jointly a competency-based curriculum based on marketplace demands so that a logical sequence of instruction can occur.
- Develop and use written agreements with specific goals and institutional responsibilities.
- Assign a director.
- Enlist state-agency policy support.

McKinney's research revealed vast differences between the ideal and what happened in real life. McKinney (1988, p. 32) found that, although they were perceived by practitioners as major program goals, "relatively few programs reported high success in achieving increased service to students, programs improvement, student retention, programs cost reduction, and/or increased service to employers." Arnold (1987) suggested 1) determining student eligibility standards for admission; 2) developing joint curricula review processes, including extensive revisions of both secondary and college programs; 3) developing guidelines for advising and counseling students throughout the program; 4) planning for joint teaching assignments; 5) sharing advisory committees between secondary schools and community colleges; 6) planning and conducting an orientation program for all stakeholders; and 7) developing a joint annual budget for all activities.

All researchers concurred with Van Allen's (1988, p. 22) assertion that relevant programming should be developed in concert with high levels of student interest, a favorable labor market, and, to a lesser extent, external funding. Researchers also concurred that the secret to success was a shared vision directly related to the climate in which the programs were based. Furthermore, researchers suggested that channels of communication be created and kept open--not just during program start-up, but for the duration (Long et al., 1986; Radcliffe and Zirkin, 1986; Warmbrod and Long, 1986; Arnold, 1987; Fadale and Winter, 1987; Selman and Wilmoth, 1989).

Moreover, in order for communication to occur, the organizational structure must streamline the communication process and allocate power and authority to a full-time coordinator (Young, 1989). Many programs have sunk under the weight of cumbersome communication channels and Young (1989), McKinney and Ballard (1987), and Key (1991) have advocated that Ouchi-like organization structures -- involving students, teachers, administrators, counselors, students affairs personnel (counselors), business, industry, labor, and community-based organizations -- be involved in goal setting and planning from the beginning. Self-interest,--,or benefits to all parties,--,is another important component facilitated by such a structure.

Whatever the curricula framework, research suggests that Tech Prep must be more than a curricular connection in order to succeed (Ames and Elsner, 1983; Arnold, 1987; Mabry, 1988; McKinney, 1988; Selman and Wilmoth, 1989). Curricula should be embraced by high levels of student and community-building activity, including assessment, career planning, remediation in basic skills when necessary, apprenticeship and job placement, student monitoring, and program evaluation (Cox, 1981;

Hall, 1987; Flack, 1988; Cook, 1988; Weiss, 1988). Many practitioners believed they should have spent more time on public relations in the beginning, since public relations is strongly connected to student recruitment and public attitudes. Several researchers noted that the "buy-in" of locals could not be coerced through state or federal edicts (Parnell, 1985; Long et al., 1986; Warmbrod and Long, 1986; Black, 1988; Selman and Wilmoth, 1989).

Successful implementation was also closely related to time and money. Although research about the implementation of change and the adoption of innovation suggests that change is best implemented incrementally (Watkins, 1981), most Tech Prep coordinators must facilitate "routinization" by linking new facts with the old and creating order (Watkins, 1981, p. 245). Hall and Hord's (1987) suggested checklist of activities to support change include developing organizational arrangements, training, consultation and reinforcement, monitoring, external communication, and information dissemination activities; an awareness of the stages of concern (including awareness, information gathering, information management, an understanding of consequence, collaboration with others, and refocusing for program refinement); and time to incorporate levels of use (nonuse, orientation, preparation, mechanical use, routine use, refinement, integration, and renewal). The pull of inertia within the education community will be a formidable adversary for Tech Prep practitioners. Their best allies should be principals, who have the key role in shaping school culture (Deal and Peterson, 1998) and facilitating change (Thomas, 1978; Hall and Hord, 1987).

Money is equally important. As Van Allen concluded,

> *"Though no one doubts local economic needs would have propelled the effort regardless of external resources without the $40,000, the 2+2 program would still be in the development phases instead of the implementation stage"* (1988, p. 20).

Van Allen also pointed out that

> *"educational programming does not occur in a vacuum. On the contrary, it takes place in a dynamic setting. It is the result of many variables interacting in a complex social system"* (p. 19).

"Establishing climate" has costs--both in human and financial capital.

The need for additional human and financial capital in the establishment of 2+2 articulation is also supported by LeBlanc's (1987) summary of Arizona's vocational education plans; McKinney and Ballard's (1987) evaluation of Rhode Island Community College's articulated electronics program; and Ingram and Troyer's (1988) articulation handbook, among others. Since Tech Prep's aims are more holistic than two-plus-two articulation, one might presume that the dollars required for implementation will be higher as well. Fortunately, Congress has responded. The Tech Prep allocation went up $27 million from 1991 to 1992 -- from $63.4 to $90 million.

What Enhancements will Help Tech Prep Systems Succeed? Ideally, the Tech Prep system pipeline should be strategically planned to include K-12 curricula (International Technology Association, 1988). Lally (1990), and Hall (1987) report that, although vocational students select career options based on interest, they often lack prerequisite knowledge. These skills can be developed during the first two years of high school. Therefore, although the law looks at Tech Prep curricula as starting in the junior year of high school, it actually begins much earlier -- at least by ninth grade.

Successful Tech Prep education plans (curricula frameworks) should not only integrate technical and contextually-taught math, science, and communication competencies, but also involve as much work-related experience as possible. Indeed, the number of students who work in high school has grown to a clear majority (Stern, 1991, p. 3). Why not incorporate that experience into the education plan?

In Germany, for example, technical and vocational students spend two days per week working and three days per week in the classroom. Peters believes that such practices in the United States might help educators know how students perform according to the needs of the workplace, instead of only how students do in relationship to each other on standardized tests (1990, p. 17-19). Stern (1991) agrees. In addition to "the work ethic," work teaches critical thinking, problem solving, communication, science, and other disciplines (Shapiro, 1988; Dole, 1989).

Successful Tech Prep systems will require increased attention to professional development among teachers (math, science, communications, and technical and vocational), counselors (middle/junior high school through college level), and administrators. Public relations is a prime consideration--starting internally and moving én masse externally. If Berryman (1987), Resnick (1987), Bailey (1989), and Natriello (1989) are correct in their suggestions about learning, entry-level worker requirements, and education's relationship to the economy, educators must develop ways to link institutions to maximize human and financial capital. The goal is to restructure education, moving away from the mass production of students to a more flexible production era. In a time of shrinking budgets, educators must produce these highly skilled employees with the competencies of "customized" education -- or craft training -- at the cost savings of mass production. Academic and technological literacy must increase in tandem, and it will be no small task. But all over the United States, small pockets of Tech Prep pioneers are plowing new ground. It is quite possible that the best thing one can do for this country -- and for one's grandchildren -- is to count oneself among us.

Update: Travis (T.J.) Asklund worked for Texas Instruments from 1990-1996. At Texas Instruments, Travis began as a machine operator and progressed to line set-up technician, to line leader, to a working supervisor, to schedule planner, to Program Manager. T.J. accepted a major career advancement in January, 1996, moving to Dell Computer Corporation in Austin, where he is now a Master Planner.

References

Ames, W.C. and P. Elsner. 1983. Redirecting student services. In *Issues for community colleges in a new era*, ed. G. B. Vaughan and Associates, 139-58. San Francisco: Jossey-Bass.

Argyris, C. 1964. *Integrating the individual and the organization*. New York: Wiley.

Arnold, J. P. 1987. Articulating secondary and postsecondary occupational program. In *Developing occupational programs*, ed. C. R. Doty, 57-64. New Directors for Community Colleges no. 58. San Francisco: Jossey-Bass.

Association of Community College Trustees. 1989. *Trustee leadership for institutional excellence: A trustee handbook for leading America's community colleges into the 21st century*. Annandale, VA

Bailey, T. 1989. *Changes in the nature and structure of work: Implications for employer-sponsored training*. New York: Columbia University, Institute on Education and the Economy, Teachers College.

Baker, G. A. III. 1989-1990. Lectures from *Leadership and decision-making: Advanced leadership competencies*. University of Texas at Austin, Community College Leadership Program.

Bennis, W., and B. Nanus. 1985. *Leaders: The strategies for taking charge*. New York: Harper and Row.

Berryman, S. E. 1987. *Shadows in the wings: The next educational reform*. Occasional Paper no. 1, New York: Columbia University, National Center on Education and Employment, Teachers College.

Black, M. 1988. *The community college-high school connection*. Farmington, N.M.: San Juan College.

Boyer, E. 1983. *High school: A report on secondary education in America*. New York: Harper and Row.

Bureau of Labor Statistics and Office of Economic Growth and Employment Projections. 986. *Projections 2000*, Washington, D.C.: U.S. Government Printing Office.

Carnevale, A. P., L. J. Gainer, and A. S. Meltzer. 1988. *Workplace basics: The skills employers want*. Alexandria, VA: American Society for Training and Development and the U.S. Department of Labor.

Colwell, S. M. 1988. *The relationship of intellective and demographic variables to the academic performance and persistence of technical college students*. Ph.D. diss., University of Connecticut.

Commission on the Skills of the American Workforce. 1990. *America's choice: High skills or low wages?* New York: Columbia

University, National Center on Education and the Economy, Teachers College.

Cook, J. N. 1988. *Working it out: A partnership venture between Greater Lawrence Technical High School and Northern Essex Community College*. Ph.D. diss., Boston University.

Copa, G. 1985. *An untold story: Purposes of vocational education in secondary schools*. St. Paul: University of Minnesota, Minnesota Research and Development Center for Vocational Education, Department of Vocational and Technical Education.

Cox, J. L. 1988. *Vocational education study: Final report*. ERIC Document no. ED 261 037. Raleigh, N.C.: Research Triangle Institute.

Cox, M. A. 1981. *The effect of an assessment: Voluntary placement system on student success at the community college*. Ph.D. diss., University of LaVerne.

Cutright, P. S., and S. V. Martorana. 1989. Composing advisory committees for community-based adult education. *Community College Review* (Fall): 34-40.

Deal, T. E., and K. D. Peterson. 1990. *The principal's role in shaping school culture*. Washington D.C.: U.S. Government Printing Office.

Dole, E. 1989. Preparing the workforce of the future. *Vocational Education Journal* (October): 18-20.

Fadale, L. M., and G. Winter. 1987. The realism of articulated secondary/postsecondary occupational and technical programs. *Community College Review* (Fall): 28-33.

Flack, S. A. 1988. *Secondary and postsecondary vocational education in North Carolina*. Ph.D. diss., Virginia Polytechnic Institute and State University.

Grant (William T.) Foundation. 1988. *The forgotten half: Non-college youth in America*. Washington, D.C.

Gray, K. 1991. Vocational education in high school: A modern phoenix? *Phi Delta Kappan* (February): 437-45.

Hall, G. E., and S. M. Hord. 1987. *Change in schools*. Albany: State University of New York Press.

Hall, N. W. 1987. *The efficacy of program selection procedures for vocational high school students*. Ph.D. diss., University of Oregon.

Hart, L. A. 1989. The horse is dead. *Phi Delta Kappan* (November): 237-42.

Ingram, M., and D. Troyer. 1988. *Secondary/postsecondary vocational program articulation handbook.* ERIC Document no. ED 298 336. El Paso: El Paso Community College.

International Technology Association. 1988. *Technology: A national imperative.* Reston, VA

Johnston, W. B., and A. H. Packer. 1987. *Workforce 2000.* Indianapolis: Hudson Institute.

Kadamus, J. A., and W. Daggett. 1986. *New directors for vocational education at the secondary level.* Series no. 311. Columbus, Ohio: National Center for Research in Vocational Education.

Key, C. B. 1991. *Building Tech Prep systems geared for the twenty-first century.* Ph.D. diss., University of Texas, Austin.

Lally, K. 1990. Eight-graders lack direction. *Austin American-Statesman* (7 April).

LeBlanc, C. 1987. *Arizona perspectives on vocational education, 1981-1989.* Phoenix: Arizona State Board of Directors.

Leiken, R. A. 1988. *Case study: 2 + 2 cooperative efforts.* ERIC Document no. 301 259. Cleveland: Cuyahoga Community College.

Lewin, K. 1951. *Field theory in social science.* New York: Harper.

Long, J. P., C. Warmbrod, C. R. Faddis, and M. J. Lerner. 1986. *Avenues for articulation: Coordinating secondary and postsecondary programs.* Columbus, Ohio: National Center for Research in Vocational Education.

Mabry, T. 1988. The high school/community college connection: an ERIC review. *Community College Review* 16(3):48-55.

McKinney, F. 1988. *Factors influencing the success of secondary/ postsecondary vocation-technical education articulation programs.* Columbus: Ohio State University, National Center for Research in Vocational Education. ERIC Document no. ED 289 053.

McKinney, F. and M. R. Ballard. 1987. *Evaluation of the electronics advanced-placement implementation process at Rhode Island Community College.* Columbus, Ohio: National Center for Research in Vocational Education.

National Commission on Secondary Vocational Education. 1985. *The unfinished agenda: The role of vocational education in the high school.* Columbus, Ohio: National Center for Research in Vocational Education.

Natriello, G. 1989. *What do employers want in entry-level workers: An assessment of the evidence.* Occasional paper no. 7. New York: Columbia University, National Center on Education and Employment, Teachers College.

Naylor, M. 1986. *Granting academic credit for vocational education.* Columbus, Ohio: ERIC Clearinghouse on Adult Career and Vocational Education. ERIC Document no. ED 275 887.

Office of Technology Assessment. 1988. *Technology and the American economic transition: Choices for the future.* Washington, D.C.: U.S. Government Printing Office.

One America, Inc. 1988. *Case studies in technology-oriented job preparation: Final report.* Washington, D.C.

Parnell, D. 1984. Five critical issues. *Community College Journal* May: 40-41.

---------. 1985. *The neglected majority.* Washington, D.C.: American Association of Community and Junior Colleges.

---------. 1988. *The role of the community college in shaping the nation: An education forum.* Conference Report Series 2(2):1-4. Atlanta, Ga.: Carter Center.

Parnell, D., and N. Armes. 1984. *2+2 Tech Prep/associate degree program: A working degree for America.* Washington, D.C.: American Association of Community and Juniorr Colleges.

Parnell, D., and D. Ponitz. 1989. *Public policy agenda.* Washington, D.C.: American Association of Community and Junior Colleges.

Peters, T. 1990. The German economic miracle nobody knows. *Across the Board.* April.

Radcliffe, C. W., and B. G. Zirkin. 1986. *Vocational-technical education program articulation and linkages in Maryland.* Cantonsville, Md: Maryland University, Maryland Institute for Policy Analysis and Research. ERIC Document no. ED 277 868.

Resnick, L. 1987. Learning in school and out. *Educational Researcher* 16(9):13-20.

Rosenstock, L. The walls come down: The overdue reunification of vocation and academic education. *Phi Delta Kappan* February 1991: 434-36.

Scott, D. C. *From homeless bogs to two-plus-two.* American Association of Community and Junior Colleges Journal August/September 1985: 14-19.

Selman, J. W., and J. N. Wimoth. 1989. *Articulation practices and problems perceived by vocational personnel in selected secondary and postsecondary institutions.* Journal of Studies in Technical Careers 11(1):25-37.

Shapiro, B. V. 1988. *Two-plus-two: The high school/community college connection.* NASSP Bulletin 40 December:30-36.

Southern Regional Education Board. 1987. *A progress report and recommendations on educational improvement in the Southern Regional Education Board States.* Atlanta, Ga.

Stern, D. 1991. *Combining school and work: Options in high schools and two-year colleges.* Washington D.C.: U.S. Office of Vocational and Adult Education.

Swanson, G. 1982. *Vocational education patterns in the U.S. In Education and work: 81st yearbook of the National Society for the Study of Education.* Chicago: University of Chicago Press.

Thomas, M. A. 1978. *A study of alternatives in American education, vol. 2: The role of the principal.* Santa Monica, Calif.: Rand Corporation.

U.S. Department of Labor, Education, and Commerce. 1988. *Building a quality workforce.* Washington, D.C.: Office of Public Affairs, Employment and Training Administration.

Van Allen, G. 1988. Two-plus-two programming: A focus on student achievement. *Community College Review* 16(2):18-23.

Vaughan, R. J. 1991. The new limits to growth: Economic transformation and vocational education. *Phi Delta Kappan* February:446-49.

Warmbrod, C., and J. Long. College bound or bust. *American Association of Community and Junior Colleges Journal* October/November 1986: 29-31.

Watkins, K. 1981. *Managing change: Roles and stages of concern of administrators for three types of higher education innovations.* Ph.D. diss., Florida State University.

Weiss, G. A. 1988. *Retraining and employment patterns of dislocated workers enrolled at a community college.* Ph.D. diss., University of Pittsburgh.

Wirt, J. G. A new federal law on vocational education: Will reform follow? *Phi Delta Kappan* February 1991: 425-33.

Wirt, J. G., L. Muraskin, D. Goodwin, and R. Meyer. 1989. *A Summary of findings and recommendations: National assessment of vocational education.* Washington, D.C.: U.S. Department of Education.

Young, J. C. 1989. The political arena of the community college president. Lecture, 15 November. University of Texas at Austin, Community College Leadership Program.

NORTH TEXAS TECH PREP CONSORTIUM

by
Romona Vaughan
Director
North Texas Tech Prep Consortium
4105 Maplewood
Wichita Falls, TX 76308
(817) 696-8752, ext. 249

The North Texas Tech Prep Consortium has been implementing technical education for students for four years. The mission is to provide economic development to the area, form linkages among member schools, improve the quality of technical training in the area, provide area employers with highly-trained Tech Prep graduates, develop partnerships, develop strong Tech Prep Associate Degree programs, and unite the region with a common goal. The consortium covers 11 counties and has 23 Independent School Districts, with plans to add more. The consortium's board is composed of 22 business and industry representatives, 12 government representatives, two labor representatives, and twelve educational representatives. The consortium has five Tech Prep approved programs: Office Technology, Electronic Technology, Computer Aided Design, Health Science Technology, and Automotive Technology. Articulation Agreements in all five programs are in place with Vernon Regional Junior College. The Computer Aided Design, Electronics Technology, and Automotive Technology are articulated with Vernon Regional Junior College and Texas State Technical College in Waco, Texas. Two approved Tech Prep pathways have seamless coordination from high schools to Vernon Regional Junior College (VRJC) and on to Midwestern State University (MSU) in Wichita Falls, Texas. The Computer Aided Design program offers students 15 hours of articulated college credit in high school at VRJC. After the student graduates from VRJC, receiving an A.A.S. degree, thirty-eight hours are articulated with Midwestern State University for a baccalaureate degree in Manufacturing Engineering Technology. The Health Science Technology pathway offers college credit in high school which articulates on to the Nursing program for an A.A.S. degree at VRJC. When the student graduates from high school, they are certified to be a nurse's aide and home health care provider. When they graduate from VRJC with an A.A.S. degree in

Vocational Nursing, 16 hours are articulated on to the four year institution, Midwestern State University. The student then can graduate with a degree as a Registered Nurse. Another program, Criminal Justice will be submitted for approval and will articulate from high school to VRJC to MSU in Criminal Justice.

The North Texas Tech Prep Consortium has started three new programs -- Electronics Technology, Automotive Technology, and Office Technology during the 1995-96 year. Twenty new Tech Prep programs have been started at ten ISDs. Several ISDs that were previous members of the consortium but did not have a Tech Prep program, started one this year and are adding programs next year. Four Office Technology programs are pending approval. A large impact has been felt with the number of Tech Prep students added during the 1995-96 year: 981 students in articulated courses. This does not count the students in the sequence courses or the ISDs that have been added since January. This is a 366 percent increase in students in one year. Tech Prep has greatly expanded its partnership lists and increased its involvement of stakeholders.

Professional development for the 1995-96 year included two career awareness workshops by Dr. Bill Witter on "Improved Career Decision Making," a workshop teaching empowerment of Total Quality Management (TQM) in the classroom, Basic and Intermediate Tenet workshops for teachers to learn how to bring current materials into classrooms and to teach administrators how to use Tenet for reports and grant information. Debra Bragg from National Center for Research in Vocational Education (NCRVE) presented a "Best Tech Prep Practices" workshop in December. A Tech Prep Overview workshop is planned for the summer to help counselors see what goes on in a Tech Prep course and learn Labor Market Information. Two SCANS workshops are planned in April and June. Two contextual mathematics workshops demonstrating hands-on activities for math teachers were held; one workshop used Center for Occupational Research and Development (CORD) materials and one demonstrated the Academic Technical Algebra developed by the Panhandle Consortium. Both stressed hands-on teaching with curriculum provided to the ISDs. Health Science Technology videos were placed at the Region IX Education Service Center for all Tech Prep Health courses to check out and use. Math CORD materials and videos will be placed at the Region IX Education Service Center for math instructors to use. Two Executive Board members, two Tech Prep staff, two post-secondary instructors, and nine ISD teachers and counselors are attending the Tech Prep State Conference, sponsored by the North Texas Tech Prep Consortium. Tech Prep staff attended two seminars by Shantel Smith, Miss America, to learn more on School-to-Work. The North Texas Tech Prep Consortium sent ten counselors and teachers to the State Conference in 1995 planning to send about fourteen to the State Conference in 1996.

The Wichita Falls ISD Computer Aided Design Tech Prep pathway is participating in a US First project that integrates academic and vocational subjects. The CAD class is working with science and math classes from three high schools to design a robot for national competition at Epcot Center in Florida. Fifteen engineers from Delphi Automotive Systems, Harper Perkins Architects, Burkner & Moore, CertainTeed, Howmet, and Sheppard Air Force Base are also working with students during and after school to design the robot. US First does for science and technology what Olympic competition does for sports. It creates a demand among students for the same excellence in technology as they have in sports, allowing students and business representatives to work together. US First shows students real world ideas and techniques, while teaching students how to work in teams with other students and business representatives in all aspects of the project. At the Carrigan Career Center after receiving all the materials, competitors are given six weeks to design, prototype, develop, build, debug, and ship a working solution to a real world problem. Students develop better thinking skills, problem-solving techniques, and improve the skills they learn in Computer Aided Design classes. US First offers business and industry a way to work with the community and students. Not only do businesses provide technical support, but financial support as well. Parents are also actively involved in the project from the first meeting.

Another national program Tech Prep classes are gearing up to use is the General Motors Youth Educational Systems (GMYES) program. Tech Prep and several automotive dealerships in Wichita Falls and the surrounding area attended a meeting discussing details about participating in the GMYES program. A goal is to have Tech Prep Automotive Technology programs certified by the National Automotive Technicians Education Foundation (NATEF) and teachers certified by Automotive Service Excellence (ASE) to teach participants in the program. Tech Prep programs will work with GM dealerships to provide career awareness, teacher shadowing, student shadowing, mentoring, and work-based experiences. GMYES is a School-To-Work program sponsored by GM.

Marketing of Tech Prep has taken several avenues. Two updated Tech Prep videos include new components of Tech Prep. Public Service Announcements are being aired on television and on eight radio stations. Brochures have been designed, printed, and distributed in area schools and at the Sikes Center Mall. A quarterly newsletter has been designed, printed, and distributed to all stakeholders to keep them informed on Tech Prep. Public presentations have been made at several places encouraging business and industry to participate and to encourage area schools to take part and start programs. A monthly advertisement has been printed in a student publication, distributed to 9,000 students in several counties at the junior high and high schools and included as an insert in the *Times Record News* subscribed to by parents and businesses in several counties.

Curriculum has been developed in two main programs: Accounting with Vernon Regional Junior College at Sheppard Air Force Base and Criminal Justice at Vernon Regional Junior College, Century City. Teacher shadowing has shown instructors things they can add to their curriculum to show students what they will need to know in the world of work. Curriculum has been purchased from CORD and donated to the Region IX Education Service Center for any school to check out for use. Four new articulation agreements have been signed with Texas State Technical College in Waco, TX, in Automotive Technology and several new articulation agreements in Office Technology with Vernon Regional Junior College. Tech Prep courses have implemented work-based experiences, shadowing, mentoring, field trips, guest speakers from businesses, and other School-to-Work techniques. A demand occupation and labor market information guide is being developed by our Quality Workforce committee with a workshop planned for summer on the new guide book.

Tech Prep participated in the Board of Commerce and Industry (BCI) Trade Fair in September. The consortium provided information on Tech Prep for students, parents, and the community, and eight Human Resource Managers gave students from several counties information on resumes, interviews, applications, and other pre-employment skills students need. Eight representatives from temporary agencies also spoke to students about pre-employment skills. Teachers from Vernon Regional Junior College and Midwestern State University spoke about Tech Prep classes at their institutions and career opportunities. Junior high students from consortium member area schools were invited to participate in a Career Expo sponsored by Tech Prep and Quality Workforce Planning Commission in April of 1996. Students learned first-hand what each career represented will offer them for the future.

Tech Prep Evaluation for 1995-96 has relied heavily on the use of competency folders, kept on each student by the teacher. The folders instruct the teacher on what competencies should be taught in the course to assure that competencies are kept at a college level. Vernon Regional Junior College uses the folders to help teachers know what competencies should be taught in each articulated course, and students can secure a copy to show prospective employers what they know and the level they have mastered. A survey of Tech Prep graduates was conducted with results being published in the newsletter. Evaluation forms are filled out after shadowing experiences. A telephone survey was conducted to see what business and industry input was being addressed in each Tech Prep course. The Mathematica national survey was completed and submitted.

The North Texas Tech Prep Consortium has been participating in the School-to-Work workshops. The School-to-Work effort has helped the North Texas Tech Prep Consortium make new contacts and partners; they will continue to grow and work together. More workplace components such as worksite visits, business presentations, mentoring, teacher shadowing, student shadowing, and paid and non-paid work experiences are being added to the Tech Prep programs continually.

The North Texas Tech Prep Consortium is looking forward to the 1996-97 grant year. We are starting new programs, increasing professional development options, adding more ISDs, and developing new curriculum. The consortium views the upcoming year as one of refinement for existing activities and programs. The 1996-97 year will be one to ensure that the proper processes and individuals are in place and prepared to continue the operations of the various career pathways should Tech Prep funding not be available for the future. The consortium will work to develop more partnerships between business and education that will continue and grow once started. The programs are developed through a collaborative process which strengthens educational programs and streamlines administrative functions so courses can continue. The articulations have been growing and will continue to grow after Tech Prep consortium activities are phased out, because students will start claiming credit and the demand will be there. Long-term funding has been addressed in ways that are appropriate for each partner, with contributions from the ISDs. The Carl Perkins grant has been used as seed money allowing the ISDs to continue developing their programs. The Tech Prep consortium staff works closely with the ISDs, causing them to buy into the program and claim it as their own.

The independent school districts have made valuable contributions for Tech Prep implementation activities to this point in time and this type of resource-leveraging will continue in the future, using ISDs as the most valuable asset. Curriculum has been developed, is in place, and will continue because results show that the students are benefiting from what they are learning. Tech Prep programs are being institutionalized.

Counselors and administrators have been equipped through professional development to counsel students for the future and to know beyond a doubt that skills acquired in high school will benefit students of the future. Students in our region know most jobs by the year 2000 will require a technical skill, a very important concept for all students. Students graduating from a Tech Prep course have a marketable skill upon graduation. Employers will have access to a better-qualified pool of workers in their local workforce from which to choose. This will sustain Tech Prep because students will be trained in a career path that has job openings in the area, and employers are concerned about students receiving the proper training.

Systemic change has occurred through Tech Prep. This body of ideas, principles, performances, and habits of change will be carried on with thoroughness and regularity after Tech Prep. The North Texas Tech Prep Consortium will continue to work to implement Tech Prep and other programs that will benefit students.

THE RATIONALE FOR TECH PREP IN THE PANHANDLE OF TEXAS

by
Lynn McGee
Career and Technology Education
Amarillo Independent School District
7200 I-40 West
Amarillo, TX 79106
(806) 354-4286

For the past four decades the educational environment has presented students with only one option: Go to college, become a professional, become wealthy and live happily every after. In reality, only 22 percent of all the students who graduate from high school ever earn a baccalaureate degree. Even this 20 percent has now saturated America with baccalaureate-prepared people as the jobs for them disappear at an alarming rate. Hardly a week goes by that a major company does not lay off (they call it down-sizing or right-sizing) hundreds, even thousands of mid-management-level people. These people are not laid off because they are dumb or do not have a skill; there is just simply no longer a need for the skills they have, and they do not have the foundational knowledge or are not willing to train in skill areas where adequate jobs exist. The high-paying jobs of the future will be available to those who have technology skills built on a solid foundation of math, science, and communications/English combined with **creative thinking skills**. The highly paid worker of the future will be the individual who can objectively apply academic knowledge to actual problem solving. We used to call this **common sense**.

For centuries, we as educators have told ourselves that we were the smartest people in the world. In America, we have thought for over a hundred years that we have the best education system in the world, and we do, no matter what we hear from the media. No other country in the world attempts to educate every young person in the country. Yes, our system needs to change and always has room for improvements. The problem is that we are not keeping pace with advancements in technology. Educators can no longer be the masters of all knowledge. Total world knowledge is now doubling every three to seven years (depending upon which source you consult). Even broken into categories, one human cannot retain all of that information. Computers have this capability, but we have not established a way to organize this information in a retrievable form. We as educators must teach students how to retrieve knowledge and then how to think creatively as the students put the retrieved knowledge to work. As educators, we must be able to teach our students to cope with this ever-growing information overload, assimilate it into their lives, and successfully use it to solve problems we cannot even predict yet. In response to this problem, the United States, under the direction of Congress, is currently engaged in a major education reform movement aimed at providing continuity of learning and quality educational opportunities. Tech Prep is a program that focuses on providing meaningful educational and career preparation for all high school students.

Tech Prep programs challenge students and prepare them to live and work in a highly technological society. These programs provide the type of work force our nation needs to compete, once again, in a global economy. Many consider Tech Prep to be the primary vehicle for economic revival through education reform. Programs will vary for individual schools but the ultimate goal is to prepare students for successful employment and lifelong learning. Through a national survey, the Department of Education discovered that by the year 2000, 85 percent of the jobs in America will require training beyond high school; however, only 15 percent of those jobs will require a baccalaureate degree. The educational environment must provide students with options that will lead to well-paying jobs that will be available when they leave school. Every national survey indicates this will happen at the community and technical colleges.

Tech Prep does this by equipping the student with a solid foundation in academics, giving meaning to the academics through real-life technological applications, then combining secondary and postsecondary education programs in order to provide the individual with the advanced skills demanded by industry. Students who do well in academics and enroll in selected technology programs in high school can receive up to a full semester of free college credit at Panhandle community colleges. The high school Tech Prep program parallels the college prep program, with the option to attend a four-year baccalaureate school still available. The key is to involve all of our students in an education environment that will equip them with advanced skills and the ability to understand complex theories and processes in rapidly changing and emerging technologies. The need for skills in math, science and communications/English will never go away. We must combine those academic skills with real-life applications in technology. For years, educators have talked about integrating the two areas of study, but they have never been able to accomplish the task. Tech Prep is doing that.

The categorization of Tech Prep as a program for all students should not lead one to believe that the process is watered down or less rigorous than the regular college prep programs. Tech Prep simply increases the options. The curriculum is competency-based, avoiding duplication. Secondary and postsecondary educators, and business and industry personnel developed the program jointly. On each grade level, students can relate to real world methodologies, understanding the rigorous academics as a by-product. Students who complete the program with at least an associate degree are able to enter the work force with advanced skills that enable them to compete in the rapidly changing, technologically advanced, global work place.

For the past four years, this **'real'** education reform process has been under development across the United States. Tech Prep is an exciting movement Congress began in 1991, giving educators in all 50 states five years to develop the process. Most states developed pilot programs or model schools in hopes that other institutions would see the validity of the process and self-initiate the program in their school. Texas approached the problem systematically with the goal of providing the opportunity for every secondary and post-secondary school in the state to implement Tech Prep. Texas is now considered a national leader in the development of the Tech Prep process. The Panhandle region has led the state for the past four years with approved programs and articulation agreements between the high schools and the community colleges. The program has helped give all educators a realistic awareness of jobs for the future and the skills necessary to acquire those jobs. The concentration on academics and particularly, the algebra project was instrumental in opening the doors to the secondary schools that make the success of the program possible.

Texas' mores set the state's population apart from most of the rest of the nation. Probably because Texans have been the object of various 'country bumpkin' jokes for so many years, they over-compensate to rise above this image. The term vocational education has a stigma attached to it that has remained an obstacle for 40 years. Texans are not receptive or kind to the technical/vocational training process. Due to this fact the Panhandle consortium embarked on the implementation process from a totally academic perspective. For the first two years of the project there was no mention of any kind of technical program development. Our workshops consisted entirely of academic teachers. We acquired $78,000 from a local foundation to establish the Center for Occupational Research and Development (CORD) Math program in the region. Twenty-four schools began a serious paradigm shift to reflect this program. After two years of using the CORD materials many pilot teachers felt the pace was too slow and the skill level was not meeting the Texas Assessment of Academic

Skills (TAAS) standards. Many teachers begin to abandon the CORD materials as a stand alone curriculum. We must not, however, view this as a failure of the overall project. There were a small number of teachers who were not able to break away from the traditional "drill and practice and rote memorization." However, most of the teachers who participated in the project now utilize the real world methodologies in their classroom. We regularly hear testimonials from parents who tell us that their students had never passed a math test before the new teaching methodology was introduced.

While the CORD program was under development, the Panhandle Tech Prep Consortium enlisted area math teachers to develop an on-grade level Algebra I curriculum that would utilize the real world, hands-on methodology and meet the skill level standards of the TAAS. The goal was to develop an integration process that would blend the CORD materials into a state-adopted text. The end product, however, turned out to be a high-level, stand-alone curriculum that related to the needs of **all** students. The curriculum immediately became popular in several areas of the state; however, as we were developing the CORD materials at the time, we did not widely market the curriculum in the Panhandle area. As the CORD pilot teachers begin looking to advance to a higher level, we provided the professional development opportunity to place the new locally-developed curriculum in their classrooms. Between the two programs, there are nearly forty algebra teachers in thirty-five schools, teaching almost 3,000 students using real world methodologies. For the past three years Panhandle teachers have provided professional development to almost 24 different districts throughout the state.

Counseling and career guidance are the keys to the success of the program. The algebra program opened the door to allow Tech Prep to be instrumental in helping schools across the Panhandle establish computerized career guidance programs in order to give students the opportunity to examine many careers that may fit their personality and aptitude. Without proper guidance in high school, the students will continue to float through the system without setting realistic goals for their life. The total educational environment, from kindergarten through post-secondary, is now working together to provide a process that will give learners the skills necessary to achieve whatever goal they have the initiative to achieve.

Congress has mandated that America will improve its educational milieu. Without this, we will not remain competitive in the world labor market. If we fail in this reform endeavor, my children will have less than I have today and my grandchildren will have far less than their parents. The standard of living will decline in America until we become willing to become leaders in change rather than obstacles. However, educators in America are stepping forward and speaking up. They are accepting the responsibility for the education of our youth. There are now almost nine thousand students in the Panhandle involved in the Tech Prep process either in academics or technologies. The Texas Education Agency has instructed school districts to apply approved Tech Prep courses to the Distinguished Achievement Program, giving Tech Prep the credibility to compete with traditional college prep programs. Counselors, parents, and students are beginning to set realistic employment goals in areas of high technology.

Colleges throughout the Panhandle are developing new and improving existing technology programs to provide skills that meet the needs of local, as well as state, and national industries. Amarillo Technical Center, a division of Amarillo College, will provide high technology programs not offered elsewhere in the Panhandle. Through industry surveys, new programs are developed to meet industry needs. As new industry comes to the Panhandle, they are invited to participate in program development. All of the Panhandle colleges offer realistic options for students involved in the Tech Prep process at the high school level. The community colleges who offer technology programs based on a solid academic foundation, will provide the high-skilled workers demanded by our nation's industry for research, development, and production. These institutions will be the education of the future. Fifteen to twenty percent of jobs in America will continue to require additional training beyond the associate degree; there will continue to be a need for the advanced skills in high technology offered by four-year baccalaureate schools.

Education reform is a team effort. Without the support of all the players it will not work. The process must begin with parents who encourage their children to set realistic goals in areas where there will be quality, high paying jobs. Area industry must continue their involvement in the education reform process by providing assistance in curriculum development and providing summer internships for teachers and students, moving education outside the closed environment they have operated in for the past 50 years.

FUTURE WORKFORCE FOR SEGUIN

For
Unemployed
Training
Underemployed
Retraining and
Education

We are
Offering
Results in
Keeping
Families
On
Rewarding
Competitive
Earnings
for
Service occupations
Engineering
General Skills
Using tools and education
Inservice for a
New quality workforce.

Janette Lawlis

THE SEGUIN CENTER FOR CAREER EXCELLENCE

by
Janette Lawlis
Coordinator, School-to-Work Transition
Seguin ISD
815 Lamar
Seguin, TX 78155
(210) 372-5770, ext. 302

The Seguin Center for Career Excellence (SCCE) became operational in October 1994 after a feasibility study funded through a grant from Southwestern Bell Telephone and conducted by personnel from the University of Texas at San Antonio. The SCCE was founded because it was determined that there was a need in Seguin and Guadalupe County for area workforce training. An industry survey was also conducted to determine employer/employee needs for training, entry, technical, and professional level jobs available and the requirements for obtaining employment in these areas.

The SCCE, as it exists today, is a collaborative and cooperative effort between the Seguin Independent School District (SISD), the City of Seguin, San Antonio Community College, and the businesses and industries of Guadalupe County. Through the SCCE, we offer training and re-training for the youth and adults of the area through various means. In-school youth receive training as part of their high school curriculum in the Career and Technology Education Department (CTE Department) and integrated and regular academics. Adults may receive training through a current JTPA eight percent funded grant or through their employers -- either at the employer's facilities or in the CTE labs at Seguin High School, through adult education classes offered at the high school, or through college courses offered by Alamo Community College District in San Antonio.

This collaborative effort provides a seamless transition into the workforce by in-school youth, the ability for youth and adults to access training not otherwise provided within a 30-mile radius of Seguin, and the ability for the entire community to access college courses without leaving Guadalupe County. With the partnerships formed with the businesses and

---

The acronym on the preceding page served as a motto for a collaborative development effort to bring Tech Prep programs to Seguin. While we have many partners in these areas, we all follow the motto that we are developing the FUTURE WORKFORCE FOR SEGUIN.

industries of the county, we have enhanced the CTE Department at the high school and provided students with access to employers, and employers access to the skilled youth exiting the educational arena.

The community, and business and industry have supported an effort that was begun in the Tech Prep initiative five years ago. We assess students at the eighth grade to determine interest and aptitude. Based on the results, we provide guidance in choosing a career pathway, and help the student build a "road map" to a destination beyond high school. This guidance may lead the student to choose a Tech Prep program to meet the goals and destination beyond the secondary level of education. Whether the students go directly into the job market, attend a technical or community college, or pursue a four-year degree or beyond, we feel that the student has an opportunity to become a lifelong learner with better potential of obtaining high-skill, high-wage employment at whatever point they enter the workforce. We currently have Tech Prep programs in eight areas:

- Agriculture,
- Criminal Justice,
- Early Childhood Professions,
- Engineering, Drafting & Design,
- Health Occupations,
- Industrial Electronics,
- International Marketing, and
- Office Systems Technology.

This initiative has expanded to the School-To-Work Transition (STWT) initiative, whereby students can now access dual credit enrollment in college level courses on the high school campus, develop career pathways, participate in on-the-job training through apprenticeships, mentorships, and cooperative education work- and school- based enterprises. The STWT program is a Pre K-12 effort to begin in the early years of the student's education to develop awareness, orientation of careers, and specific occupational training. We have integrated the SCANS skills throughout the curriculum, specifically in the high school course work, to prepare the students to become valuable employees with work ethic and academic skills to access higher level jobs in the workplace.

The voting citizens of Seguin took the initiative in economic development in the city and county two years ago, and passed a half percent sales tax. One-fourth of the tax is to reduce property taxes and the other one-fourth is for economic development in the area. Devoted to bringing businesses and industries into the area, the Seguin Economic Development Corporation (SEDC) is responsible for expending these funds to meet the goals of the corporation, such as bringing new business and industry into Guadalupe County. However, as a rural area approximately 40 miles east of San Antonio and approximately 50 miles south of Austin, we realize that we must "grow our own" workforce. To do this, we feel that it is necessary to provide for training in Guadalupe County. Since there are no technical or community colleges, the local school district is the logical entity to provide this type of training and has the facilities and personnel to meet the demands of the local employers. With this in mind, the SEDC has taken the initiative to assist the school district in purchasing state-of-the-art, industry-standard equipment, materials, and software to provide training and retraining for the adults and students of the community.

The SEDC, in the past two years, provided over $90,000 to the district for the purchase of computers, CADD software, electronics equipment, and a Computer Numerical Control (CNC) milling machine. These grants have given the district an opportunity to leverage funds and access other grants totaling in excess of $45,000 and be awarded a $250,000 matching funds JTPA eight percent grant.

In response to community needs, the SCCE has offered training in First Line Supervision, computer aided drafting, metal inert gas (MIG) welding, blueprint reading, Spanish, keyboarding, MacIntosh, DOS, WordPerfect 5.1 and 6.0, Lotus 1,2,3, other office-related training, cake decorating and flower arranging. With the new CNC milling machine and an industry-driven curriculum, courses will be offered in the fall for area employees to meet the needs of local employers. Guadalupe County is a highly industrialized metal-working area, with several industries that produce heavy equipment, and steel reinforcement rods and bars. There are also several tool and die companies in the county. To accompany this training, "real-world, hands on" academics are offered in the high school curriculum, and in night classes. In excess of 375 adults have received training through the SCCE. We also have a tool and die apprenticeship program with 22 participants. The JTPA program has provided opportunities for GED completion, job readiness, and skill training to over 150 participants since October, 1995. In July, 1996, we received word from the Texas Workforce Commission that this JTPA project has been funded for another year with a $227,000 matching fund grant.

As a result of the cooperative efforts of all parties -- the community, employers, and education entities of the area -- we feel that we have developed an environment that will benefit everyone in the partnerships and provide a beacon for the citizens of the Texas.

We at Seguin hope the following acronym will be a guide that assists your community to develop high quality Tech Prep programs.

BEACON OF LIGHT FROM SEQUIN

Basic
Education
Accelerated
Competencies
Offered
Now
OF
Literacy and lifelong learning
In
General education and
High
Tech skills
FROM
Service occupations
Engineering
General skills
Using tools and education
Inservice to provide a
New quality workforce
for Governor Bush's
BEACON STATE OF TEXAS

Janette Lawlis

CAREER PREPARATION TODAY FOR TOMORROW

by
Geralyn Elmore
Career Consultant Specialist
Capital Area Training Foundation
CATF -- Lexington ISD
P.O. Box 248
Lexington, TX 78947
(409) 773-4019

Change is inevitable. No one likes it. No one wants to change, but it happens anyway and to get ahead you better be open minded or be left behind. And we all know that tomorrow will bring about more change, due to emerging technologies which continue to restructure our work and our lives, and education will have to change to keep students prepared for these demanding changes.

In March 1996, I made a presentation at the State Tech Prep Conference on career development. My thoughts in making this session stimulating and interesting were somewhat limited as to how this topic would draw that most needed session attendee, the school counselor. After some thought and deliberation, and considering my work with counselors in trying to bring about change, I focused on a movie that was comical, yet showed the efforts of change and meeting the demands of the church -- *Sister Act.* With the cast of characters of the movie, a relationship was shown among them and those in the educational system. The Arch Bishop -- Superintendent, Priest -- Counselor, Reverend Mother -- Principal, Nuns -- Teachers, Convent -- School. Well, for those of you have seen this movie, you know how difficult it was for change to occur, because failure was always lurking. But with the buy-in of the hierarchy, change brought about the success that was needed for the community and for the church. Buy-in is needed of the administration for the change to take place in preparing our youth for the 21st century and in career development activities.

What buy-in? With my work with the Capital Area Training Foundation as a Career Consultant Specialist, working under a School-to-Work grant in the area of career development, I can relate to the importance of buy-in. In order to create a system whereby career development is important, the approval and support of the hierarchy of the district must be present. Principals, counselors, and teachers too often see the area of career development as an added burden to their load and will not undertake this task if the support of the higher level of administration is not present. Career and technology educators naturally incorporate this into their curricula and career development, but efforts need to be made to reach those many students who do not enroll in these programs. With the support of administration, all staff members can see the importance of this effort that is very much needed for the students.

As educators today, we often hear from employers and business professionals that today's youth are not prepared with the necessary skills upon entering the workforce. As a result, education is changing to meet these demands with the Tech Prep programs, Goals 2000, Senate Bill 1, and School-to-Work Opportunities Act. Students need to have an understanding of their interests and abilities and know how to use the K-12+ educational system to their advantage for workforce readiness in career preparation. This doesn't happen overnight and preparation should begin early.

So how does this relate to counseling and career development? In order for our students today to be ready for tomorrow, change must take place in the process of preparing our students for their futures. We cannot sit back and expect our students to suddenly put everything in perspective during their junior and senior years of high school. Preparation needs to take place throughout a student's educational career.

Where do we begin? First, career development must be understood.

- A career is made up of many experiences and many decisions.
- The needs of individuals are developmental in nature and so are their career development needs.
- When we talk about career development, we are talking not only about training for a job, but about cognitive social and career needs.
- Career development should be delivered by a variety of people, not limited to counselors.

With these concepts in mind, a strong career development program can be put into place. This program should, for all students, be preventive, proactive, competency-based, developmental, comprehensive, and include a partnership.

The counselor cannot do this alone! Territorialism or turfism cannot exist! The counselor must be the catalyst for the career development program within their school structure. The counselor should utilize teachers in this process, keeping them informed of the changes in the labor market and their effects on job demands, and of how curriculum needs to be restructured to meet these demands. Teachers need to be aware of how their courses fit into career maps as well as how their courses relate to the preparation of the student for the world of work. Instructional staff need to be made aware of articulation agreements between postsecondary institutions so that they too can relate these connections to the student. Teachers need leadership in developing career guidance curricula and the counselor needs to be prepared to mentor when necessary. Counselors can help students develop career portfolios, which motivate the students to plan and set goals, and makes transition from school to the workplace or postsecondary education more successful. This task will require a working team of educational staff to take ownership and assist in developing, revising, and updating. A plan of action will be necessary to determine what staff members will be involved -- "who", what plan of action will be taken -- "how", and whether or not this will be accomplished during the school year. Team effort, commitment, and administrative support are imperative.

Parents should be aware of up-to-date information about the increasing need to better prepare their youth for the changing workforce. Parents and students need to know the choices available to them. Parents and counselors need to support their students and assure them of the value of options other than the baccalaureate degree. Finally, parents need understand how they can support students as they move through the curriculum and explore various career options.

Counselors must network with community leaders to establish mentoring activities between school- and work-based instruction, cooperative training programs, internships, and field trip programs to allow students to become familiar with options available to them in preparation for life after high school. Meaningful advisory boards with appropriate members (a board that does not exist on paper alone), marketing efforts, and staff development can greatly enhance the business/industry/labor connection for students. Staying informed of what is taking place "in the field" on the nature of the world of work is very valuable. Keeping those "in the field" informed about the issues facing education in preparation of students for work is also just as valuable.

Counselors and postsecondary institutions need to arrange articulation agreements that provide incentives to students to finish high school and pursue additional training. As they work with the students daily and play a part in career guidance, teachers need to be informed of these articulation agreements.. Keeping everyone in touch is the key.

The National Occupational Information Coordinating Committee (NOICC) has developed National Career Development Guidelines, these are structured by area and grade level. Major areas include: a) self-knowledge; b) educational and occupational exploration; and c) career planning. Levels extend from elementary to adulthood. Career development is a lifelong process, not something that occurs only in high school or college.

To focus on career development throughout various levels, grades K-6 are involved in career awareness. Students develop an awareness of the many employment opportunities available to them. Students develop an awareness of self in relation to employment in a potential career. Students develop stronger foundations for positive attitudes toward work and society. Students develop attitudes of respect and appreciation towards workers in all fields. Students make tentative choices of career clusters to explore in greater depth during the middle years.

Grades 7-10 are involved in programs of career exploration and students explore key occupational areas and assess their own interests and abilities. Students familiarize themselves with occupational classifications and career clusters and develop an awareness of relevant factors to be considered when making career decisions, gaining experience in meaningful decision making. Students develop tentative individualized career development plans (ICPs) and arrive at a tentative career choice.

Career preparation in grades 11-12 is a prime focus. In career cluster programs, students acquire academic occupational skills and knowledge for entry-level employment and/or advanced occupational training or education. Students participate in work-based learning opportunities and sequential programs leading to advanced placement. Students have the opportunity for transition into work or further education at baccalaureate institutions.

With career development taking place throughout a student's education, they are able to make informed choices. Students see where their education is taking them and the meaning can take focus. This process, as stated earlier, cannot be accomplished by counseling staff alone. As the African proverb states, "It takes an entire village to raise a child."

What's taking place at Lexington, Texas -- a 2A district, 50 miles from Austin and 50 miles from Bryan/College Station? To begin with, Lexington ISD has two counselors, one Pre K-5, the other 6-12, and a Career Consultant Specialist, where under a School-to-Work grant, we have worked to put in a system for the students that is functional and improving. This program is what it is today, only with buy-in and support from the school board, superintendent, and the principals within the district.

The elementary counselor has developed a strong program that incorporates all the aspects of the National Career Development Guidelines for students of this level. Competencies of the guidelines are worked into the elementary comprehensive guidance plan. Examples of activities that take place are Goose Creek, I Can Curriculum, -- Career Awareness, JOB-O-E Profile, Career Day, and the Job Jungle. The CHOICES program, self-esteem programs, classroom speakers on careers, *and 5th grade beginning* the "Get A Life" career development portfolio that continues through the 12th grade, are other activities that are incorporated into the curriculum of students Pre-K through 5.

Students in grades 6-8 continue the process of career development. Teachers address various competencies of the National Career Development Guidelines through various curricula. Since the junior high/high school counselor is shared by two campuses, individual classroom activities are limited. Participation on the part of the teaching staff is vital to the continuation and support of career development for the students. Career exploration activities are designed as part of teaching units with each of the disciplines. All students in grades 6-8 continue development of the "Get A Life" portfolios and each student begins a career portfolio folder for various career related activities. In the 8th grade, students take a career interest/ability inventory, the ACT EXPLORE, and results are then worked into a unit of study involving a career cluster and/or specific career field related to the World of Work Map. Students then use the information in developing an ICP, making connections with high school courses and career goals. Parents are involved in this process, informed of what is available for the student, and help connect courses that relate to the student's interests and goals. Parents are very supportive of this process and want their children to have a plan for high school so their child will not be caught in the trap of having selected "shopping mall" courses, making no preparation for the future, and being unprepared for anything beyond high school.

In grades 9-12, career guidance competencies are worked into various curricula and activities by both the counselor and the teaching staff. In the 9th grade, students complete activities in career research writing through their English class. The students also update, revise, and make changes to their ICPs as needed to meet their career interests. In the 10th grade, students take the ACT PLAN assessment, a follow-up of the 8th grade EXPLORE. Results are used in revising and updating ICPs as needed. In the spring of their 11th grade year, students take the ASVAB as another source for identifying interests. Through 11th grade, student in english classes complete an extensive research paper relating to their career goals. This research paper has taken the place of the traditional 11th grade research paper and has become very meaningful and enjoyable for the students. Again, students revise and update their ICPs as needed. In the 12th grade, students are given their career development portfolio folders to complete various employability activities, preparing them for the workforce or extending their education. Students also have an opportunity to take part in job shadowing and internships through various programs, giving the student a chance to decide if this is really what they want to do. Efforts are made to incorporate connections with work- and school-based learning, giving students even more opportunities for career development.

Career Night, as well as the traditional College Night, are planned to inform students in grades 7-12 of the various options available to them in making career choices. Field trips and guest speakers are utilized in preparing students for opportunities within career fields.

A Career Center has been established within the junior high/high school library, making a career resource center available for all students to use. Two computers with software are available for students to take career assessments in addition to those offered in the particular grade levels and other self-scoring assessments are available for the students. Other software programs provide information on resumé-writing, interviewing skills, occupational and employment outlooks, careers, and college financial aid and information to name a few. Career-related materials located in one area make it accessible to students and very user-friendly. Teachers that have students involved in career-related activities have discovered the enormous amount of information that can be accessed in this one area. Parents are also delighted to see what information is available for their students.

In order to achieve the goals of making career development a continued process, it is important that support and follow-up of all activities occur. Change has, and is still taking place at Lexington ISD. The most important thing is that students are being prepared to meet the challenges of change that await them upon graduation. Students need to be prepared for a career and be given the best opportunity to use what the school system can offer to meet the goals of those careers.

MAKING OUR STUDENTS MARKETABLE

by
Gene Schatz
Principal
Whitney High School
P.O. Box 518
305 San Jacinto
Whitney, TX 76692-0578
(817) 694-3457

As a nation we hear that American education is failing to train our youth for the jobs of the twenty-first century. This has motivated Whitney High School to examine the philosophies of the Tech Prep movement and use them throughout the curriculum to drive educational reform. The mission of the school was evaluated against twenty-first century needs, and the need for change became evident. A guide was needed. Two studies, the SCANS Report and Goals 2000, were used as resources to establish this guide. It was found that the philosophy of the Tech Prep movement was most closely aligned with the Whitney High School (WHS) plan; therefore, all curriculum and operational change had to be proven to support the development of a quality worker before it was considered for implementation.

The staff found that the WHS plan provided relevant educational opportunities to all students without reducing any emphasis on higher level learning in preparation for a baccalaureate degree. Whitney is a high school with a totally Tech Prep philosophy, where every student is being prepared for a technical field of the twenty-first century. The curriculum does not require that all students take defined vocational courses, but it does mean that every student must declare and become proficient in the training necessary for an occupation identified within a growing field of work in the next century.

From local and state research the staff designed six areas of real world proficiencies that relate to success in the world of work in our geographical region. These proficiencies are clustered in areas labeled: Human Services, Agricultural Mechanics, Office Business, Agri-Business, Health Occupations, and Legal.

Students can choose from an occupation that needs four or more years of college, to one that needs six weeks of post-high school training within each cluster. From their selections, individual student plans are developed to guide them through high school courses. Whitney High has adopted a school-to-career philosophy, which commits the faculty to assuring that all students graduate with the knowledge and competencies to be successful in the workplace.

The Tech Prep process begins in the eighth grade with a one semester course in career investigation which includes work on a computer operated career selection database. Successful completion of the course requires a commitment by the student to a career cluster and research on occupational requirements within the cluster. It also involves working with their parents on a four- or six-year individual education plan. If student interests change while in high school, the parents, student, and the counselor work together to reassess the plan and modify it.

Whitney High School begins by identifying students who need a modified curriculum to gain basic computative and communication competencies to be employable by administering a ninth grade test, the Wonderlic assessment. The Wonderlic assists by placing students in a specific approach to learning algebra and indicates to all the teachers of a given student the communication skills that need to be emphasized. Specifically this test identifies those students who do not learn well with traditional teaching methods such as lecture and reading assignments. Amazingly educators are finding that only about 25 percent of students learn best by this method. The remaining 75 percent of the students learn best by approaching content through another form of presentation. These alternative approaches all deal with "contextual" learning activities rather than the abstract activities used in lecture and reading. For too many years, educators were quick to label students not achieving expectations in these type of classes as "stupid," but recently researchers have found all students can learn when content is delivered in a manner which matches their learning style.

After the first six-week period each fall, all parents are encouraged to accompany their child to parent's night at school. The teachers report on the student's progress to each parent and have either individual conferences or make appointments for future conferencing. A Career Fair with representatives of post graduation training opportunities is also held that night for students and parents to attend. This is followed during the second six-week period with a career day hosted at a nearby junior college for all sophomores and freshmen. During the third six-weeks period major industries of the region are invited to Whitney High School to offer mini-workshops to all freshmen students on what these industries expect of beginning employees.

In February of every year, each student's plan is reviewed during an individual conference. Prior to the second semester of the sophomore year, every sophomore takes the PLAN interest inventory, and the results are matched against the four or six-year plan on file for the student. Following this test, group conferences are held with students expressing similar career plans, enriching their choices with more specific information on their chosen fields.

During the first semester of the junior year all students take the PSAT to be sure those with college ability have considered college options. Those with the ability to do well are encouraged to take the SAT and/or ACT in the spring of their junior year. Over 60 percent of the juniors take one or both of these college entrance tests.

During the fall of the senior year, representatives of the United States Armed Forces administer the ASVAB test of vocational ability to each senior. This cultivates a testing schedule which allows a continuous check and balance of the development of each student toward their chosen career goal.

The entire Whitney High School curriculum was designed with the Tech Prep approach in mind, and new courses were added to supporting Tech Prep. All students take two years of algebra at Whitney High School. In these two years, however, algebra can be taught through four different approaches. Students can move from a class using one approach to another class with a different approach if they are not comprehending the material. They are allowed to begin the first semester of each level of algebra over again if they are not understanding the basic concepts. A tutorial class in mathematics is also offered for those lacking specific skills in math such as fractions or decimals. All math labs have graphing calculators and computer programs illustrating math concepts which are utilized at all levels, algebra one through calculus.

Besides the new approaches to algebra, two options for junior English, and four options for senior English, (English IV, Honors English, technical writing/business communications and college English) are offered. At all levels, the language arts use many learning styles within the same classroom, allowing many avenues to comprehension. They also teach in an interdisciplinary fashion with social studies, business and science classes.

The business department offers an office procedures course leading to cooperative training the following year. Also course content is realigned in the computer-assisted classes of keyboarding, computer applications and computer programming so they could be articulated for credit with nearby higher education institutions.

Sciences are taught from an applications approach. Students may choose the manner in which they learn physics, for example. They may take the academic approach where text is supported by experiments or the technological approach where experiments introduce the text. The science department supports the medical field through a Tech Prep-designed anatomy and physiology course offered for college credit.

The agricultural science department articulates all higher level courses with post-secondary institutions including new courses in wildlife management, floral design, landscape architecture and aquaculture. With Lake Whitney and many state parks in the school district, students have many opportunities for employment in these fields.

The culminating courses for seniors are multi-occupational, cooperative training and often count as concurrent credit at Hill Junior College. Almost one-half of this senior class is in one of these programs.

All courses emphasize the use of real world experiences in making instruction relevant. Even courses such as business, agriculture and home economics, where this has always been a basis for instruction, have had to revise their curriculum based upon the higher expectations of industry due to technological advancement. Career-driven courses such as aquaculture, landscape design, and childcare have taken the place of workshop and sewing. Most technical courses at Whitney High School can articulate or tie directly into college and post-secondary technical schools through articulation agreements.

Whitney High relies heavily on Deming's total quality management (TQM) techniques, allowing student input into learning and using this as a model for them to experience similar processes in the workforce. Students of all levels are combined in heterogeneous groups in classes and placed in charge of their own learning and behavior under set guidelines. Students are required to accept responsibility for their actions. All teachers have been trained to help students accept responsibility for their own learning.

The alternating-day, block schedule has been found to be the most conducive to the type of learning that must occur to meet the proficiencies the school has set. This schedule, along with introducing the concept of self-responsibility and the emphasis on workplace applications has resulted in raising the attendance rate above 95 percent in all four high school classes, raising academic grades, and reducing failures to the lowest levels in the school's recent history. Cooperative learning is used by all teachers and the longer class periods are very necessary in allowing this process to develop.

Flexible scheduling allows upper level students the ability to accommodate work and family schedules into the hours of 7:30 AM and

4:00 PM. Senior and junior students on cooperative education programs for credit may be gone from campus for up to three hours a day, gaining on-the-job employment skills in related businesses.

After-school time is frequently used for staff development. Teachers meet, by departments, to share strategies, or assemble for presentations on learning styles and teaching techniques. They also attend committee meetings, which operate every aspect of the school through a site based decision-making process.

School district workshops are held where teachers from all disciplines at every level meet to discuss how one discipline can be better delivered to advance the students. Mathematics is the area most developed in this process because it has the most evident need according to standardized tests. The campus is part of the Effective Schools Project at Tarleton State University and presently has working agreements for concurrent credit with Hill Junior College, Texas State Technical College, and McLennan Community College. The Region 12 Service Center and Heart of Texas Tech Prep Consortium are active partners in facilitating the implementation of all programs to enhance student achievement.

The community is a partner in education by using non-school facilities for some educational programs and working with employers to utilize students on formal and informal work-study programs. Advisory committees made up of people from the community are active in many disciplines.

All change must begin with a vision, a mission, research, and a plan. These all revolve around the basic premise that the most valuable attribute a school can give a student is the motive to be successful in an occupation with opportunity, then everything else falls into place. Curriculum is driven by research. Teaching methods are driven by the mission to teach workplace skills along with curricular content. The operation of the school, including the daily schedule, is driven by teaching methods.

The paradigm that must be broken is that schools dividing students into basic groups and designing rigid curricula for each group, such as college bound, vocational, etc., in order to teach students the proper content for success. The new paradigm working at Whitney High School is that curriculum is one undivided unit. With this model each student selects, through closely guided choices, the portion of the curriculum that best suits their job interest and aptitude. Students are allowed to progress as high as their ability will allow in that interest area. They are further encouraged to never stop learning, but continue to seek more technical training after graduation so as to remain current in their field, or a related field, all of their working life.

Secondary-educational reform appears to direct itself toward business and industry involvement in high school education. We read articles expounding on how American education is failing to train our youth for the jobs of the twenty-first century, and too may times these articles make the assumption that this is an education problem. When the outcomes needed from our educational system in the twenty-first century are analyzed, one sees the blame for poor past preparation to be much broader than our educational system. It is a result of societal attitudes and business demands as a part of society, losing sight of what the major purpose of education needs to be, preparing our young people to be productive citizens/workers.

This is an article about change. What is needed in our secondary schools? We need business leaders and parents demanding that school boards adopt a school-to-career philosophy so that our graduates remain a marketable commodity. School boards need the courage to insist that administrators study the competencies needed in the demand occupations and insist they be imported into the curriculum. Administrators need the daring to allow teachers to be innovative in course design, offering necessary workplace competencies along with required content. Teachers must have the nerve to ask business to be a part of their course offerings, imparting directly to the student the competencies they expect.

This is a circle of competency that does not require additional funding, of additional courses, only a change in attitude as to what is relevant to our future workers. The emphasis has to be on the worker as the core of the future and the school providing the foundation, knowledge and skills that students can use to be productive workers.

COLLABORATION AT ITS BEST

by

Jeri Pfeifer
Director of Career and Technical Education
P.O. Box 981
Abilene, TX 79604
(915) 677-1444

Through an interesting series of career opportunities, I found myself moving from the principalship of a 5A high school to the district Director of Career and Technology Education. The timing for such a move fell in perfect alignment with the School-to-Work Opportunities Act and Senate Bill I, which called for the complete rewrite of Texas Essential Elements to Essential Knowledge and Skills, a subtle but critical emphasis shift from knowing to knowing and doing. Additionally, Texas passed House Bill 1861 establishing the Texas Workforce Commission and one-stop career centers with Local Workforce boards as their governance bodies.

NAFTA is in place along with a state review of Texas, changing resources from a limited natural resource base in the oil industry to another kind of natural resource: people. Texas people. Diversity and dreams as big as the state itself. We approach the coming century with new technologies and new energies and a new workforce potential. What an exciting time to enter Career and Technology Education.

All the pieces seem to be in place: ready students, talented and dedicated faculty, business collaborations and community coalitions of all formats, supportive administrations and boards of education. So why is it, that in a time of so much opportunity and projected workforce needs matched by a talented pool of Texas students, do juniors and seniors in high school have so little knowledge of their career options and even less passion for their high school experiences altogether?

I had heard it often enough . . . learning to prepare for more learning . . . (students) will need "this" (whatever) in college, but students do not yet know their major or their college. At many graduation ceremonies, I happily reported that 85 percent of the graduating class planned to attend college. Planned. But only 20 percent ever earn the baccalaureate degree, and that figure has held constant for over fifty years.

There were a few in high school who knew their career directions and could or would take courses that held some relevance for them. Lucky students. Their school day made sense because courses were deliberate choices and lead in a specific direction. But for the vast majority, the answers to "what are you going to do after high school," were 1) college or 2) "I don't know." How, after thirteen years of learning, could students not know enough about themselves to know their career strengths?

So, partially to answer that question and to prepare for my own career transition, I explored career education in Texas. What a wealth of opportunity! There are models of excellence in K-12 career education all over the state. So many districts were willing to present at conferences or share ideas over the telephone. Others sent copies of their career education materials at my request and offered other resource ideas. It seems I'm not the only one excited about the future of career education.

Share the information wealth was also the theme from the Texas Education Agency that referred my queries to the outstanding career education curriculum materials that are now housed at Texas Tech (formerly at East Texas State). The Texas Education Agency (TEA) also suggested two experimental courses -- Career Investigation and Career Connections -- taught at various grade levels across the state. Again, support and curriculum materials were plentiful.

It didn't take long to discover Texas State Occupational Information Coordinating Committee (SOICC) -- that marvelous information and distribution center that will send volumes to teachers or students for a toll-free phone call. Not long either to discover the national and state guidance counselor curriculum that issues a strand of career education objectives K-12. The counselors were even willing to assume responsibility for this critical process by accepting the "counselor-driven" career education mandate.

With my office, my home, my car, and my brain full, my immediate experience at the high school campus still puzzled me: why do students have so little notion of their career futures? Is this just a local question? Or do educators across Texas get the same "college" or "I don't know" answers?

The logical conclusions were that 1) that ample resources were available, 2) that counselors wanted to accept the accountability for career education, but they also have many other duties, and 3) the most important finding -- students needed more access to career education much earlier than junior and senior years in high school. Years earlier.

It was about this time that the director of the West Central Texas Tech Prep Consortium called me to collect ideas for the 95-96 school year. "What do we need to address?" he asked.

Without hesitation, I said, "Middle School."

We need to talk to students -- all students -- before they channel themselves into a "college" or "I don't know" high school plan. We need to encourage students to identify their career strengths, aptitudes and interests and translate their findings into course selections and high school experiences. We need to present post-secondary articulation opportunities in the planning stages rather than trust that students will discover these options -- somehow -- after they enter high school.

The plan to address all students would begin during the 95-96 school year in seventh grade with career education opportunities. In 96-97, we would add emphasis in grades five and nine. In 97-98, we would work toward grades K-two and junior-senior years of high school, but the place to begin for our school district was grade seven.

"Middle School," I said.

Each district organizes its middle school or junior high in a fashion appropriate to that community. Some house grades seven through nine, some seven-eight; Abilene ISD's middle school houses six through eight with individual high school planning and guidance at grade eight. Also, each school district addresses its need for career education in appropriate community-shaped fashion. Some have an experimental semester course called Career Investigation supplemented with materials from TEA. Others imbed career education within another course. Some districts integrate career education within their foundation courses and teach career concepts in math, English, social studies and science. All of these are workable and effective arrangements.

Abilene's middle school plan allows all students to take Life Management Skills and Industrial Technology at the seventh grade. Both these courses inherently focus on life skills awareness and development. Placing a career education component within either or both of these classes would be a logical move. Moreover, many of the teachers had already incorporated career education within their own curriculum. Two middle school teachers, representing two campuses, coordinated a summer apprenticeship program that placed eighth grade students in various workplaces for a week of shadowing and hands-on experience. We had a great foundation on which to build a district-wide career education component, and with Tech Prep involvement we could incorporate the best of this region in our programs.

Our Tech Prep director, Bill Daugherty, knew exactly who to call. He wasted no time in contacting a counselor in Rotan, Texas, who was fast becoming a mentor for school districts all over Texas in the areas of career education and career pathway implementation at the middle school level. With two Abilene teachers who developed summer apprenticeships, the insightful and visionary Rotan counselor who designed career pathways for her district and my first year exuberance, we made a collaboration team of four educators with West Central Texas Tech Prep Consortium. Our mission was to change the world and/or middle school career education instruction. In our minds, each carried equal significance.

Tech Prep brought us together, personally, as we came to know each other, and professionally, as we came to know the work each had done. Tech Prep also aligned training for this collaborative team including Third Annual Model Schools Conference in Cincinnati, Ohio; the Texas Tech Prep Annual Conference; TEA summer professional conferences and multiple local seminar speakers, most notably Bill Witter. We ordered all of the curriculum materials from Texas Tech and requested sample career pathways from twenty school districts in our quest for models. We reviewed assessment materials from ACT to ABCD/IBCD, CORD and dozens of others in our visits to one-stop career centers. We invited materials suppliers to show us their wares, and, of course, we were immediately overwhelmed.

Tech Prep gave us a forum to collaborate, space to meet, boxes to store huge volumes of materials and access to resources that we could not reach individually. Of critical significance was the financial support that included the purchase of ACT Discover career software for each requesting middle school campus in the region. Convinced that we had exhausted the research phase, we began to narrow and focus our work toward a feasible program to implement in our respective districts.

Where to start in our strategic planning? Program mission. What do we want this program to do? What single, demonstrable, measurable significant achievement do we want our students to reach as a result of our collaboration? Frankly, with chalkboards full of worthy ideas, settling on a mission was a difficult task in our planning and program development. We knew we wanted students to assess their individual career interests and aptitudes. We knew we wanted to introduce the concept of career pathways as a precursor to high school planning. We knew this unit would be best implemented as a module in an existing class. Thus, we finally established the following:

The Career Pathway Module will enable students to conduct a guided self-assessment and to investigate career education choices as a prelude to graduation planning.

Once the mission was in place, our task was to design learning experiences that would provide these opportunities for students and do so within the available time frame of an existing curriculum. From course objectives in the TEA materials for Career Investigation and from the

National Counseling Center Guidelines, we then posed the following questions that students would answer as a result of the module:

- Who am I? (self-assessment)
- What are careers? (world of work)
- What is the relationship between school and work? (why do I have to study this?)
- How will I make career and education decisions? (how do I plan my future?)

By continually returning to the mission in our planning and working within the context of these four questions, we were able to keep the questions specific and manageable rather than listing more than we could possibly handle. These four questions became course goals and outlines for the learning activities to come later:

Who am I? Course Goal: Students will gain understanding of their own interests, abilities, aptitudes, and values through hands-on activities for self-appraisal and career exploration experiences.

What are careers? Course Goal: Students will gain career and related job training information leading to tentative career and educational plans that are relevant to their individual traits.

What is the relationship between school and work? Course Goal: Students will understand the relationship between required courses and the world of work including various forms of employment, job acquisition and job retention.

How will I make career and education decisions? Course Goal: Students will develop tentative career and education plans which will include emphasis on basic skills, career skills and options for secondary and post-secondary training opportunities.

Once the goals were in place, the team identified objectives, then learning activities to allow each student to achieve the four goals of the program. (Those goals and objectives are listed following this article.)

As soon as our lesson plans were aligned under course objectives and goals, Tech Prep organized training and program dissemination throughout the region. Some thirty school districts sent representatives to Rotan, Texas, for a day-long training seminar which included an overview of the entire K-12 and post-secondary rationale, specific course objectives, a hands-on workshop using ACT Discover software and a review of the summer apprenticeship program. Participants went home exhausted but enriched with lesson plans, curriculum materials, and instructions to pilot the program as they elected during the spring of 1996.

Presentations outside the region soon followed with interest at the State Tech Prep Annual Conference and the anticipated National Tech Prep conference. Some fifty school districts have requested follow-up information at the end of the pilot stage. West Central Texas Tech Prep Consortium still serves as the collaboration point for the project.

One of our favorite products is the course name: Class Assessment Career Training (ACT). We asked the students to name the course. Naturally, their suggestion was perfect: Class ACT.

Each team member was effective on respective campuses and even at district levels, but together, they designed a curriculum module that incorporated the best of their practice with existing materials and models. Tech Prep provided the resources for collaboration and dissemination that will help middle school students in nineteen counties make better personal, educational and career decisions about their next years in school and beyond.

In this case, the sum was greater than the total of its parts. The sum will increase in value with every student who participates in Class ACT. And what's next? We already have plans on the board for fifth grade and ninth grade. Looks like our next call is to Tech Prep.

GOALS AND OBJECTIVES

Goal 1: Students will gain understanding of their own interests, abilities, aptitudes and values through hands-on activities for self-appraisal and career exploration experiences. Students will:

- Objective A: assess individual interests, abilities, aptitudes, and values through the use of standardized and/or informal assessment data.
- Objective B: analyze the effect that individual personal traits have on career decision-making and career success.
- Objective C: relate their personal traits to career planning.

Goal 2: Students will gain career and related job training information leading to tentative career and educational plans that are relevant to their individual interests, abilities, aptitudes, and values. Students will:

- Objective A: gain a realistic perception of the world of work including a productive work ethic associated with any career.
- Objective B: identify resources which provide pertinent information concerning career opportunities, including new and emerging occupations and priority occupations.
- Objective C: use Career Pathway classifications to analyze career opportunities, including new and emerging occupations and priority occupations.

Goal 3: Students will understand the relationship between required courses and the world of work including various forms of employment, job acquisition, and job retention. Students will:

- Objective A: identify and apply basic academic skills relevant and transferable to the duties of a variety of careers.
- Objective B: recognize the effect changes in economics, society and technology have on business ownership and career opportunities, as well as on job duties and the labor force.
- Objective C: develop a work ethic which includes dependability, punctuality, ethical practices, team work, and effective oral and written communication skills.

Goal 4: Students will develop tentative career and education plans which will include emphasis on basic skills, career skills, and options for secondary and post secondary training opportunities. Students will:

- Objective A: analyze their individual traits, preferences, academic potential, and life goals to establish profile and career match.
- Objective B: select a career pathway.
- Objective C: use their selected career pathway to develop personal education goals leading to a graduation plan.

CAREER PATHWAYS: A HOLISTIC APPROACH

by
Patsy Sanford
Career and Technology Counselor
Belton Career Studies Department
Belton High School
P.O. Box 269
Belton, TX 76513
(817) 933-4651

Career Pathways. The term now seems as much a part of Belton High School as the tiger mascot or school song. But many seniors who listened as their 1991 commencement speaker assured them that their futures could soar higher than an eagle must have felt uncertainty as to the practicality of his advice.

At that time, we who were employed by the Belton ISD also realized that too many of our students were standing, but not finishing the race. That fall, while attending a national education conference in Denver, Belton's Career Studies Director, Ken VonGonten and Assistant Superintendent, Dr. Jean Kemp heard a principal from Woodland, CA, as he described a dynamic program called Career Pathways, designed at nearby Sonoma State University. He gave statistics as to how Woodland had lowered its dropout rate, raised its test scores, and improved attendance as a result of guiding students to establish early career goals. Ken VonGonten was so impressed by the program that he used part of Belton's federal allotment to take eleven people from Belton to Woodland for their Visiting Schools Career day during spring break of '92. These eleven included the high school principal, three counselors and five department heads, along with Mr. VonGonten and Dr. Kemp.

Based on Woodland's model, the group returned to implement Career Pathways in Belton the following fall. We felt that this program, by helping each student establish an early career goal, would enable him or her to choose high school courses appropriate to that goal, strengthen his incentive to stay in school and pursue post-secondary education, and encourage teachers to make instruction more relevant to real-world outcomes.

Some logistics of the implementation have included the following:

- Getting a buy-in of this philosophy from the administration, school board, faculty, parents, and students through oral presentations, in-service programs, mailouts, newsletters, and hands-on activities. All teachers serve on a CPAT (Career Pathways Advisory team) to help with program planning and student advising.
- Creation of color-coded Career Pathways brochures, patterned after those from Woodland, but adjusted to meet our needs as to high schools courses offered, job opportunities in the area, credit requirements and broad career cluster groups as identified in students test results. The six Career Pathways we use are: Business Contact (for outgoing and entrepreneurial students), Business Operations, Technical, Science, Art/Communications, and Social Service. These six were chosen to coordinate with test results students receive and are updated each year.
- We have used three tests from ACT for the basis of our program; the Career Planning Program (CPP) administered to all 8th-graders, the PLAN to all 10th-graders, and the ACT to all BHS seniors (funded by our school). During the fall of '96, we will convert from the CPP to ACT's EXPLORE for 8th-graders. EXPLORE will not only relate each student's results to one of the six pathways, but will also coordinate for early indication of a student's probable ACT and TAAS scores.
- Just prior to pre-registration, each student receives one of the color-coded Career Pathways guidance brochures to match his/her test results with interpretation as related to a possible career cluster. Each brochure gives a suggested four-year plan of courses for each career family within the cluster.
- Ken also obtained a grant for a Career Studies Center three years ago. It is now one of the buildings in the high school complex and houses some career studies courses along with academic ones. We wanted to avoid the stigma of having it known as "that vocational building." A multi-purpose career lab within this building serves as a student research center with career, college, scholarship, and much more useful information which can be accessed through printed material, videos, computer programs and/or interactive discs. Freshmen students, in small groups, receive a hands-on orientation in the lab. A new technology center with four computer labs is now available in the main high school building and the new library area has become a media center as well. There, students can work on courses and can

access the INTERNET along with career and college information. Several computer programs which have been particularly helpful are DISCOVER, COLLEGE VIEW, COIN, FUND FINDER, and Peterson's FINANCIAL AID. (We owe a debt of gratitude to Tech Prep for their funding of the DISCOVER program.)

- Career Pathways and our accelerated block scheduling have instigated changes and additions in our course offerings. Examples include Health Careers which allows students to do rotations in three large local hospitals, and courses in technical writing, the Bible as literature, law enforcement, environmental science, and horticulture.
- We have held school-wide career workshops for students each year, allowing students input into career offerings and scheduling each student with workshops of his or her choice.
- This past fall, our 75 Teen Involvement students (a leadership class that stresses service to the community) spent a morning shadowing an adult in the career field to which they aspire.
- We now have a number of articulation agreements with junior colleges and technical schools in the area.
- Career emphasis has been stepped up in the elementary, intermediate, and junior high schools as well. All have had career fairs, and teachers are encouraged to bring career speakers into their classrooms and to otherwise make their instruction as career-relevant as possible. This fall, the reading classes at the junior high will use the Vocational Biographies and Career Guidance booklets as part of the guidance there.
- Belton counselors help plan, and our students participate in an area-wide college night at Belton's Exposition Center. This fall we will participate in an area Career Night sponsored by Central Texas Quality Workforce Development. We are working with the Development Corporation of Belton and Quality Workforce Development personnel to further coordinate what is being taught with skills and abilities employers desire when hiring.
- A number of our teachers have participated in discipline integration projects.
- Portfolios are now being used throughout the school system.
- In Belton, we maintain close contact with students' parents. Besides one-on-one contacts, we invite parents to programs explaining various programs and processes of the high school including pre-registration, financial aid, etc.

- We hope to include opportunity for teachers to have a brief shadowing experience during the in-service in the month of August.

There is now evidence that Belton High School students are familiar with and relate their courses to a Career Pathway each has chosen for his or her future. Also, whereas Belton High School was targeted by the state for its high dropout rate based on 1994 figures, the dropout rate has gone from 119 to 9 students[1] and our attendance average for 1995-96 is at 94.5 percent. The secret is that we had an overall goal and that all administrators, faculty and staff worked hard as a team. Yes, we truly recommend for all schools, a comprehensive long-range plan such as our Career Pathways.

---

[1] A lot of the success of this decrease in the dropout rate is due to following up and tracing those kids that had dropped out, establishing whether or not they continued school elsewhere.

SHADOWING PROGRAMS FOR SMALL RURAL COMMUNITIES

by
Charles Wendt
Van Horn High School
P.O. Box 899
Van Horn, TX 79855

The primary goal is to establish a series of programs providing junior high school and high school students with opportunities to shadow employees of local businesses. Other goals are to: 1) establish a program that shows the importance of education and training to become successful; 2) provide a means that will enable businesses to take an active part in the local educational system; and 3) create a school-to-work relationship that in the future will provide locations for internships and practical training for students.

Selection of Businesses. The selection process will include an examination of types of businesses available within the community, targeting businesses based on their contributions to the community: looking for businesses that will provide unique insight into the school-to-work transition; make a positive impact by reflecting pride in ownership; encourage employees to take pride in themselves and the work that they do; and treat customers fairly, welcoming the opportunity to serve them.

The selection process will avoid businesses that historically have students that make up a large percentage of the work force; students are already familiar with these businesses and understand the processes involved in becoming successful with these businesses. Often these jobs are considered minimum skills entry jobs and do not require a high school diploma. This program is designed to stimulate the desire to become better educated and professionally successful.

Suggested Processes. After selecting the businesses to be targeted, contact must be made with each business. There are several methods by which prospective business can be reached. In small rural communities one should work from the premise that everyone knows each other. This makes "cold calling," walking in and trying to see the chief executive officer without an appointment, a very easy method to use. Remember you must talk to the owner or manager of each business who can make company decisions, and this person is often busy attending to the daily operation of the business. Be professional in your presentation. Do not give a "generic" presentation, but tailor each presentation to fit the person and business visited. Be brief and polite. Do not attempt to volunteer more information than is needed, or make promises that may not be kept at a later date. Be prepared to answer questions and relieve any apprehensions that may arise. Inform the person that this program is in the preliminary stages and that all problems associated with it are not resolved at this time. Assure the person that every foreseeable detail will be taken care of, and as unforeseen problems arise, they will be dealt with in a timely and professional manner.

By using the "cold calling" approach to visit businesses, excessive contact is not made, which ties up the owners' and managers' time making appointments and checking schedules. Often, after a short wait, your intended person will be free to discuss your programs. These few minutes give you a chance to collect your thoughts before entering discussion and allows you to become familiar with new surroundings. This will make you much more comfortable. Usually five minutes will be sufficient to do your job. If the person that you need to see is busy, out of the office, or has a full schedule, you will need to make an appointment. Do not set the appointment to see the person on their first day back from vacation, for example, when the person maybe trying to catch up on office work and would be possibly preoccupied while you make your presentation.

Alternative Processes. If "cold calling" is not appealing, an appointment can be made for each visit. This is a very professional method of solicitation. Be cautious: often you will be speaking directly to the person with whom you need to make an appointment. This person may ask the nature of the appointment, and if you are not careful, you will end up conducting the visit at that moment on the phone. This is not good. You will not be able to see facial expressions, nor body language, but only hear the tone of the voice. Even if you are able to avoid having a phone interview, the person you spoke with may be creating reasons why they do not want to be an active part of the program without knowing all of the details of the program.

Appointments are a good method to use if you must travel to make the visit. The person you need to speak with should be available at or near the preset time. Be sure to arrive before the appointed time; this gives you time to collect your thoughts and survey the surroundings before beginning your presentation.

If all else fails, then phone visits could be used. This is not considered the best method of relaying your message and can lead to a breakdown in communications. If at all possible, you need to visit in person.

Subject. Remember that you are talking to a person that is busy running a business in which you want to place students. Be brief and to the point, not blunt. Smile and be courteous during the discussion even if you see that you are not going to be successful. Tailor the presentation to fit the needs of the business and be complimentary toward the business and the people working in the business. Do not run down the businesses' competition while attempting to encourage the business to become a part of your program. If you run down the competition, the person with whom you are speaking may assume that you will run them down while making other presentations. In small communities even those who compete for business are socially friendly.

Explain the purpose of your visit in one or two sentences, and then go into the program that you want to offer. Explain that the program gives a student the opportunity to see, first-hand, the complicated processes used in a day-to-day operation, that decisions must be made continuously and often they could have tremendous impact on the business, and that problem-solving is the key for a person's and a business' success. Make the person feel honored and proud to have the chance to help in the education of a young adult. Do not make the person feel that he or she is just signing up to go with the flow. Try to get the person excited and inquisitive about the program. Ask for input. Find out what type of student they want and what they look for in prospective employees. Ask for feedback. What can they suggest to make the program successful. Remember, you are dealing with successful people, so you should capitalize on their skills and ability.

Selection of Students. Classroom teachers will recommend students for participation in the program. The list of candidates will be submitted at a prearranged time during each six weeks grading period. The campus (junior high school and high school) principals will then select the best candidates to become a part of the program during that grading period. The campus principal will determine the number of students that can be recommended by each classroom teacher.

Students will not be selected only on academic achievement. Other factors that will influence selection are attendance, tardiness, discipline problems, and general attitude in the classroom. Remember, these students are representatives of your school, and you want them to make you and your school proud. This does not eliminate a student that has been absent, tardy, or is a discipline problem from being a part of the program; in fact, this program may be a part of the solution in overcoming some of these problems. Each student and situation must be judged on the circumstances and the person at that time. If a student has a difficult time relating the connection between the classroom and real life, this program may answer several of the "why" questions the student has. This is not really considered an at-risk program, and should not be used as such. Remember that the careers being investigated are professional and the student needs to have a level of self-pride and motivation.

The best case scenario would have all eligible students completing a careers and skills inventory for the guidance counselor. The counselor would then compile the information and give the information to the campus principals. This information would be used to help place students in work situations that interest the student. This, in turn, would give the student more insight into the educational needs for the jobs that interest them. Also, this may be a chance for a student to learn that the career of their choice may not be what they want to do the rest of their life, and prompt them to investigate other possible careers.

Process for Placement. As students are nominated and evaluated for each program, the best candidates for each type of business would then be assigned. Each business would receive, by mail, a list of students that could be assigned to them. The businesses would be asked to review the list and if they have a problem with any of the persons on the list they are to contact the appropriate campus principal within a given time frame. If it becomes apparent that a conflict could arise by placing the student in this business, the student would be removed from the list, and if possible, placed in another business. Students are not to be informed of any of the placement procedures. The student is only informed after the business has agreed to take them, at which time the student also has the right to refuse to go if he or she would feel uncomfortable.

After students are matched with businesses, arrangements are then made for the students to visit the business and make the necessary observations. Businesses need to be notified at least a week in advance and again the day before the student is to arrive to prevent any surprises. If unexpected complications arise and the students need to be rescheduled, notify the business at once. The school district is responsible for providing the students with transportation to and from the work site.

Dress Code. While participating in the program the students will need to dress in appropriate attire. Boys need to wear a tie, dress shirt, and dress pants. Girls need to wear nice dresses or pants and a nice blouse. Shorts should not be considered the correct attire for students to visit the different businesses. The students need to look and act professional at all times.

Business Follow-Up. Each business will receive a follow-up evaluation form from the school district, designed to provide the school with information about the student and their behavior, and about the program. The form should permit the business to make honest evaluations and suggestions that would not only benefit this program, but also other educational programs. Keep the follow-up form as simple as possible. Remember these are busy people.

Student Follow-Up. The student will compose, and turn into the appropriate campus principal (or his or her delegate), a thank you letter to the person that worked the most with the student. The thank you letter needs to be turned in on the first day back to school after the visit.

The students at all grade levels should provide the school district with feedback. They need to provide their peers with an insight into the different work experiences they encountered. The 7th grade students that participate would automatically become eligible for a follow up program in the 8th grade.

Possible Methods of Feedback. The methods of feedback are unlimited. Written assignments, oral presentations, and career portfolios are possible methods by which the students may provide feedback. Students can complete a written assignment to be turned into the English department for grading on grammar and then turned over to other departments in which the student is enrolled for grading on content. How nice to have a paper for English class about how an electrician uses math to determine wire size based on load and run and to have this same paper submitted to the math department for assessment on content. Written reports can be posted in the hallways for everyone to read and placed on display during open house and public school week. The options are limitless.

In classes that lend themselves to students making oral presentations, the student can present to the class their experiences and then go into a question-and-answer session. The student may need to create visual aids to help the class understand. Oral presentations could be made by the students to the school board or community groups and organizations. Again the options are limitless.

Other methods could be the creation of a career portfolio to be maintained by the student and carried with him/her from junior high school through high school. This would take a commitment to keep it current and it would have to be reviewed at prearranged intervals.

It is important that each of the students' individual classroom teachers become active in creating methods of generating feedback from the student. Every teacher should set aside a time for those students that have participated to share their experiences. The more supportive everyone is, the more likely the students and the program will be a success.

APPRENTICESHIP TRAINING: THE ELECTROMECHANICAL TECHNOLOGY AND AGRICULTURAL SCIENCE AND TECHNOLOGY CONNECTION

by

Jim Lovelady
Director, Technical/Vocational Division
Angelina College
P.O. Box 1768
Lufkin, TX 75902-1768
(409) 633-5246

The connection between technical programs to educate electricians and millwrights and agricultural science and technology has emerged as a strong link in the Deep East Texas Tech Prep Region of the state of Texas. Cooperation and involvement between secondary schools, Temple-Inland, Inc., and Angelina College have resulted in a Tech Prep program that utilizes skills learned by students in high school agriculture education programs.

The Region. The Deep East Texas Region of the state of Texas is one of 24 statewide planning regions. It consists of twelve counties best described as rural. The population of the region is 318,258. The heavily forested region depends on government and manufacturing as major sources of employment. The unemployment rate for the region is around 7.4 percent. Several of the counties in the region are considered below the poverty level for average wages with approximately 140,800 persons in the workforce. Manufacturing employment accounts for 23 percent of the jobs in the region compared to 13.1 percent statewide. The largest employer is government with 24.5 percent of the workforce and includes occupations in education.

The Schools. The 55 independent school districts in the region report a total enrollment of 61,397, ranging in size from a low of 90 to over 8,000 students. The typical school district has an enrollment of between 400 and 500 students in K-12 grades. Enrollment in Tech Prep programs is reported to be 1,297. Twenty-five of the districts have a total of 53 approved Tech Prep programs with an agreement with Angelina College. Six of the districts have Tech Prep programs that are articulated with the electromechanical program at Angelina College.

The College. Angelina College is the only community college in the region. Chartered in 1969 as a public county college district, it had a 1996 spring enrollment of about 3,800 students. Slightly over half of the students live outside the county of Angelina and either commute to the main campus or attend one of the five teaching centers located in other counties. The college has seven approved Tech Prep programs with eight advanced skills certificates. Enrollment in the college Tech Prep programs is 652 students.

Industry Participation. Temple-Inland, Inc. is a major employer with five local forest products mills. The mills depend heavily on electrical and hydraulic equipment to handle wood products. The company evaluated its future workforce needs for electricians and millwright and discovered that an aging workforce and the lack of a qualified applicant pool would not be sufficient to maintain the operations of the mills in the future. Plans were jointly developed by company trainers and expert workers with Angelina College personnel to address the problem. An on-site workplace skills analysis was performed for the occupations at two of the mill locations. The technical curriculum was developed earlier in a DACUM process and was modified in response to the findings to incorporate workplace and technical skills needs. The advisory committee for electromechanical technology approved the upgraded curriculum and an application for a Tech Prep program with at least one school district was approved by the Texas Higher Education Coordinating Board.

Agricultural Science and Technology. The rural region has supported agricultural science and technology in public schools since the formation of the districts. Traditional topics in food crops and beef production are still the mainstay of course offerings. Local livestock show contests are frequent spring activities in the small communities. Courses in farm structures and machinery offer an opportunity for hands-on projects in welded projects such as trailers and cattle handling equipment. VICA student contests for welding projects are conducted throughout the region.

The instructors of the college and the high school teachers worked one-on-one with each other to determine if the competencies taught at the high school were the same as those in the college courses. At the present time, several courses are designated and articulated for credit. The students must complete the high school courses with an 85 or higher score, enroll at Angelina College, and complete twelve semesters hours of credit courses in electromechanical technology. The articulated courses are then posted to the students' transcript as Tech Prep articulated courses.

The courses in farm mechanics and electricity offer the best combination for direct skills transfer from the high school program. Wiring service outlets for chicken houses, barns and other out buildings provide the students with skills related to residential wiring in the college program. The high school courses of introduction to agricultural mechanics, home maintenance and improvement, and agricultural mechanics are articulated with the college course in residential wiring. Farm machinery classes that engage students in both the theory and application of hydraulic operation of farm equipment, such as tractors and cattle handling equipment, offer the best applied skills. Students gain experience in the practical solution of hydraulic problems. The high school courses that closely match the college courses include introduction to agricultural mechanics, agricultural power technology, and agricultural mechanics. The three combined courses are articulated with one college course in hydraulics.

Implementation. A summer workshop was conducted for regional high school agriculture teachers. The workshop was conducted in a train-the-trainer format. Twelve teachers attended, representing eleven school districts. They received three days of intensive hands-on instruction and classroom theory on the operation of hydraulic systems. Temple-Inland, Inc. provided the trainer and the training facility, and Angelina College provided the equipment. The Tech Prep Consortium director promoted the workshop to the high schools and provided assistance in the coordination of the workshop.

The instructors were provided with ten lab exercises to perform a portable hydraulics trainer and a lap-top computer loaded with the latest hydraulic simulation software, equipped with hoses, gages, pumps, cylinders, and valves. The teachers were given an opportunity to learn the software in support of the lab exercises.

The teachers then scheduled two weeks to use the hydraulics lab equipment. The equipment is transported to each high school campus by Temple-Inland, Inc. and the college instructor provides a short refresher on the operation of the hydraulic trainer and the laptop computer software to the teacher. The high school teacher uses the equipment during the following two weeks to instruct the students in farm related hydraulic applications and theory. The computer simulation allows the instructors to demonstrate the theory of operation, build example circuits, and show the application of hydraulic symbols.

The Apprentice Program. The apprentices are screened by the Temple-Inland, Inc. human resources department and selected for testing by Angelina College. The Test of Adult Basic Education (TABE) and the Differential Aptitude Test (DAT) are administered to the applicant apprenticeship trainees. The company established the range of scores for the selection criteria of the trainees. The test results and other employment criteria are used to select apprentices. The apprentices become full-time company employees subject to the benefits and employment practices of any other employee including drug testing, probation, and attendance requirements.

The apprentices attend Angelina College on Mondays and Wednesdays of each week during the semester. The normal course load is 12-14 hours, which includes three or four courses. The apprentices work in the local mills on Tuesdays, Thursdays, and Fridays of each week. Thursdays are maintenance days for mills; extensive maintenance procedures are carried out on this day. However, Tuesdays and Fridays provide the opportunity for more specific training, such as motor control centers and troubleshooting skills, taught by the company based trainers.

All the apprentices take a core curriculum of courses. However, the electrical and mechanical curriculum are very much different. For example, the electrician apprentices take courses in electrical theory, electronics, commercial wiring, and programmable logic controllers. The millwright and mechanical apprentices take courses in hydraulics, pneumatics, power transmissions, and machine shop. All apprentices will complete an associate of applied science degree in an approved Tech Prep technology program. The trainees may take up to two and one-half years to complete the program. Prior college education in academics or technology courses by some trainees allow them to graduate earlier.

There were 14 apprentices in the initial selection in the fall of 1995. Five more were added in the spring for a current total of 19. An additional 11 apprentices will be selected for the program by the fall of 1996. It is anticipated that high school graduates who have taken advantage of the agriculture classes in the participating school districts will apply and be elected. The target composition of the trainee group is 40 percent existing employees and 60 percent new employees, a possible 30 in the program at any time.

There are summer work opportunities for students who have completed the four-year high school plan for electromechanical technology. They may apply directly to the company for the apprenticeship program. If a student is not successful on the first selection process, he or she may enroll in the college program and take the same courses as the apprentices, increasing the opportunity for selection during the next round of interviews.

Evaluation, to continually assess the quality of the program, should maintain an upward trend of improvement. An instructor in the electromechanical program is assigned to the apprenticeship program to facilitate the schedule of classes, enrollment, and advisement of the apprentices. The instructor works very closely with the Temple-Inland, Inc. trainer and human resources personnel.

The Tech Prep program connection between industry, the college, and the schools in the Deep East Texas Region offer the opportunity for students to pursue a traditional agricultural science and technology program in high school and utilize that experience in a career path for technical training.

References

College preliminary Spring 1996 headcount-provided by the registrar of Angelina College.

ISD enrollments-from *Snapshot '94:1993-1994 School District Profiles*, Texas Education Agency, Division of Performance Reporting; 1993 enrollments represent approximate federal fiscal years 1992-1995.

Independent school district participation by county and program areas-in state-approved Tech Prep programs; from the Education and Training Clearinghouse Tech Prep program inventory, Texas Higher Education Coordinating Board, as of January 1, 1996.

Estimated Fall 1995 secondary and postsecondary enrollments-Deep East Texas Tech Prep Consortium data.

Regional geographic information-*SOCRATES Regional narrative Report for Deep East Texas Quality Workforce Geographic Evaluation Model, 1993 Report.*

TRANSFER PLANNING GUIDES: A SOUTHWEST TEXAS APPROACH TO TRANSFER OPPORTUNITY

by
John De Leon
Southwest Texas State University
Department of Technology
San Marcos, Texas 78666
(512) 245-2137

Approximately 30 percent of students who enter a community college do so with the intent of transferring to a four-year institution; approximately 20 percent successfully transfer. However, for some community colleges, the number of students who do transfer may be less than five percent of the total enrollment. This is because economic, geographical, cultural, and academic barriers tend to keep students from transferring to a university. First, the shift of federal support programs to an emphasis on loans discourages many. Furthermore, remote universities present a geographical barrier that manifests into a psychological barrier. Finally, the lack of congruency in general education and major course requirements among universities and community colleges fortifies the academic barrier confronted by students.

Pathways to the Bachelor's. High school graduates and GED recipients earn the privilege of obtaining post-secondary education. Some pursue trade certification, others associate degrees, and others go on to receive a bachelor's degree. The Bachelor of Applied Arts and Sciences (BAAS) degree at Southwest Texas State University (SWT) was designed for students who have completed 60-66 hours towards a selected technical specialization at a two-year institution, or who possess a two-year technical associate's degree. It is a professional four-year degree attracting career-oriented technical people who seek either employment in industry or job advancement. The Bachelor of Science in Technology (BST), on the other hand, attracts students who seek professional/technical careers and who have preconceived notions of graduating from a four-year institution. There are three majors under the BST degree heading: Industrial Technology (IT), Engineering Technology (ET), and Information Systems Management

(ISM).[1] IT majors have the option of specializing (39-47 hours) in visual communications, manufacturing, or construction. Students majoring in ET may choose (12 hours) from environmental systems management, plant production systems management, community systems management, and communications systems management. The ISM major does not allow for a specialization option.

Statement of Problem. Traditionally, transfer initiatives for the Technology department centralized around the BAAS degree. However, this tactic tended to complicate matters for community college transfer students with aspirations of obtaining a BST. Students were required to take added course work at SWT because of the incurred loss of earned community college credit hours. This resulted in a generation of credit hours not applicable toward the BST. Furthermore, students who sought advice on transfer options had to set individual appointments with faculty and admissions personnel. In retrospect, this traditional approach for transfer opportunity proved to be very time consuming for all parties involved, and needless to say, a financial burden to the student.

Transfer students are important to SWT. In the 1995 Fall semester, 55 percent of SWT students attended another school before coming to SWT. Moreover, transfer students from two-year colleges comprised 31 percent (N=1,455) of the new students at SWT during this period. Needed was an innovative approach in the form of a written guide that could accommodate the transfer populations entering SWT. A written guide would eliminate the guess work for students by providing them with pertinent transfer information, and a sequence of community college courses that would be 100 percent transferable. A one-page transfer planning guide that furnished both admission requirements and a degree outline would streamline the academic transfer process for students seeking a bachelor of science degree. Specifically, this guide would allow transfer students to acquire a BST degree from SWT.

Methodology. The transfer planning guide formulation process was applied to community colleges on an individual basis[2]. It began with the identification of community college courses deemed transferable. The SWT Office of Admissions took on the initial task of reviewing courses for transfer. The Admissions office could only scrutinize freshman and sophomore level courses because of university transfer policy. Upon review, courses fall into one of the following categories: 1) directly equivalent course number, 2) elective non-advanced (ELNA), 3) activity (ACT), 4) non-transferable (NT), 5) technical and vocational (T&V). Subsequently, the Technology faculty member assigned to coordinate the transfer initiative incorporated the directly equivalent courses and the T&V courses onto a transfer equivalency guide. This equivalency guide was a critical element in the formulation of the transfer planning guide. It served as a worksheet that allowed for the synthesis of SWT courses and transferable courses into a functional degree outline. Specifically, the transfer equivalency guide comprised two sections: SWT general studies requirements, and Technology core/specialization courses (please see the sample following this article). Presented to the Technology faculty for approval were draft copies of equivalency guides reflecting the three different BST majors. The Technology faculty deliberated on the transferability of the T&V courses from a departmental perspective. Particularly, the faculty decided to accept as direct equivalents T&V courses that had comparable course descriptions to their Technology counterparts. The confirmation of these courses set departmental precedence. T&V courses were for the first time formally recognized as direct equivalents for Technology courses.

---

[1] The Information Systems Management degree will be removed from the SWT catalog after the 1996 calendar year due to lack of enrollment.

[2] Austin Community College was the first community college for which transfer planning guides were formulated. The process began in the Spring semester 1994 and was completed one year later.

Extrapolation of approved course information from the transfer equivalency guides led to the construction of the transfer planning guides. They were submitted to the Office of Admissions for approval, and resubmitted to Technology faculty for review following modifications made by the Office of Admissions. Ultimately, the transfer planning guides were presented to the Dean of Applied Arts and Technology for final approval.

The transfer planning guides provide students with an outline of courses that not only transfer as direct equivalents, but apply toward the degree for one of the BST majors. Most importantly, the guide serves as a road map for students to follow. It catalogues eight semesters of course requirements that lead to the BST. The first four semesters of study found in the guide reflect community college courses; the remaining four reflect SWT courses (please see the sample following this article). SWT counselors use these as a recruiting tool; Technology faculty use them in advising.

Currently, transfer planning guides are established with three community colleges: Austin Community College; San Antonio College, and St. Phillip's College. The goal is to establish transfer planning guides with community colleges throughout the state of Texas. However, it should be noted that the formulation of transfer guides was not possible for some two-year schools that were interested in possessing them. The inability to formulate guides with these schools was due to the low number of technical/vocational courses that are offered by these colleges. Nonetheless, students from these schools would still be able to complete their general studies curriculum before coming to SWT. If such a situation arises, students are encouraged to work directly with admission counselors and Technology advisors to tailor a degree outline that will maximize the number of transfer credit hours.

Conclusion. Despite its lengthy process, and the encounter with formidable obstacles along the way, the transfer initiative has produced good results. For one, future transfer planning guides will be relatively easier to construct. A system protocol has been devised that will accelerate the formulation of transfer guides with community colleges. Foremost, a number of students are currently pursuing the BST through use of the guides. This trend will no doubt increase the diversity among student populations at SWT. Another benefit of this process was that it opened communications between the Office of Admissions, Technology faculty, and faculty at the two-year schools. Finally, the continued support for this initiative will enable the Technology department to realize articulation opportunities endorsed by the Tech Prep Statewide Professional Development Consortium of Texas.

Transfer Equivalency Guide

SWT General Studies Requirements

SWT	ACC	IT	ET	ISM
Reading & Writing				
English 1310	English 1613	Y	Y	Y
English 1320	English 1623	Y	Y	Y
Speaking & Listening				
Communications 1310	Speech 1603	Y	Y	Y
Computation & Mathematics				
Math 1315	Math 1743	Y	N	N
Math 2471	Math 1854	N	Y	Y
Philosophy & Critical Thinking				
Philosophy 1305	Philosophy 1613	Y	Y	Y
Historical Perspective				
History 1310	History 1613	Y	Y	Y
History 1320	History 1623	Y	Y	Y
Political Perspective				
Political Science 2310	Government 2623	Y	Y	Y
Political Science 2320	Government 2613	Y	Y	Y
Natural Science Perspective				
Chemistry 1410	Chemistry 1634	Y	Y	Y
Chemistry 1420	Chemistry 1644	N	Y	Y
Physics 1410	Physics 1614	Y	N	N
Social Science Perspective				
Economics 2320	Economics 1623	Y	Y	Y
Literary Perspective (3 hours)				
English Literature (Eng 2310^1, 2320^2, 2330^3, 2340^4)	(Eng 2613^1, 2623^2, 2653^3, 2663^4)	Y	Y	Y
Physical Activity (Two Hours)		Y	Y	Y

Technology Core/Specialization Courses

SWT	ACC	IT	ET	ISM
Technology 1320	Basic Carpentry (BCT 1054)	Y	N	N
Technology 1330	Welding Processes (WLD 1094)	Y	N	N
Technology 1332	Manfu. Materials & Processes (MFG 1024)	Y	Y	Y
Technology 1450	Fundamentals of Photography (PHO 1073	Y	N	N
Technology 2310	Engineering Graphics II (EDG 1044)	Y	Y	Y
Technology 2320	Adv. Cabinet & Furniture Const. (BCT 2054)	Y	N	N
Technology 2330	**NONE**	Y	Y	Y
Technology 2344	**NONE**	Y	Y	N
Technology 2350	Darkroom Technology II (PHO 1044)	Y	N	N
Technology 2365	Prepress II (PRT 1054)	Y	N	N
Technology 2370	Electronics (ELN 1148)	Y	N	N
Computer Science 1308	Computer Science 1003	Y	N	N
CIS 1323	Computer Information Systems 1003	N	N	Y
CIS 2324	Computer Information Systems 1023	N	N	Y
CIS 2371	Computer Information Systems 1044	N	N	Y
Chemistry 1420	Chemistry 1644	Y	N	N
English 2351	Technical Communications 1603	Y	Y	Y
Math 1317^1 or 2417^2	Math 1753^1 or 1764^2	Y	N	N
Math 2472	Math 1864	N	Y	Y
Physics 1410	Physics 1614	N	N	Y
Physics 1420	Physics 1644	Y	N	Y
Physics 1430	Physics 2614	N	Y	N
Physics 2415	Physics 2624	N	Y	N

Note. The guides shown are for Austin Community College (ACC). They reflect initial work accomplished during May 1994

BEST COPY AVAILABLE

ADMISSION PROCEDURES

1. Submit completed application form and all credentials to the SWT Office of Admissions by the stated admission deadline (Fall--July 1, Spring--December 1, Summer I--May 1, Summer II--June 15).

2. Submit an official transcript from each institution attended to the SWT Office of Admissions. Students must be eligible to return (e.g., free of suspension, dismissal or enforced withdrawal) to all previous institutions regardless of grade point average (GPA) or degrees received.

3. A minimum 2.25 grade point average (GPA) in all transferable courses is required. In computing the GPA, grades of A, B, C, D and F are computed as recorded. Grades of W, P, Q and X are disregarded and grades of WF and I are averaged as F. Grades in non-transferable and technical and vocational courses are disregarded.

4. Submit an application for on-campus housing, if required, or apply to live off campus.

Students transferring directly to Southwest Texas State University from a community college may elect to follow the SWT catalog in effect at the time they entered the community college, or any subsequent catalog. Students are reminded to refer to their designated catalog for information relating to the University and School of Applied Arts and Technology requirements for curriculum, graduation, probation/suspension, and other general information.

For more information, contact:

Chair, Department of Technology
Department of Technology, Room 101
Southwest Texas State University
San Marcos, Texas 78666
512/245-2137

Office of Admissions
429 North Guadalupe
Southwest Texas State University
San Marcos, Texas 78666
512/245-2364

REVISED 2/95

SOUTHWEST TEXAS STATE UNIVERSITY/AUSTIN COMMUNITY COLLEGE
TRANSFER PLANNING GUIDE
1994-96 CATALOG

For major in Industrial Technology
Bachelor of Science In Technology
Concentration in Manufacturing

ACC COURSE OF STUDIES

First Semester
____ English 1613
____ History 1613
____ Chemistry 1634*
____ Speech 1603
____ Math 1743*

Second Semester
____ English 1623
____ History 1623
____ Chemistry 1644*
____ Economics 1623
____ Math 1753 or 1764*

Third Semester
____ Engineering Design Graphics 1024*
____ Engineering Design Graphics 1044*
____ Literary Perspective--3 hrs.[1]
____ Government 2623
____ Physics 1614*

Fourth Semester
____ Technical Comm.1603
____ Welding 1094
____ Philosophy 1613
____ Government 2613
____ Physics 1624*

*Course may have prerequisite required by Austin Community College.
[1] Select one from: English 2613, 2623, 2633, 2643, 2653, 2663, 2713, 2723

SWT COURSE OF STUDIES

First Semester Junior Year
____ Art 3313, Music 3313 or Theatre 3313
____ Technology 2344
____ Technology 2370
____ Technology 3310
____ Technology 3364
____ Management 3303

Second Semester Junior Year
____ Technology 3322 (Int'l. Perspective)
____ Technology 4345
____ Technology 4380
____ Physical Education Activity--1 hr.
____ Technology 1310
____ Management 4330

First Semester Senior Year
____ Technology 2330
____ Technology 4330
____ Technology 4357
____ Technology 4362
____ Technology 4373

Second Semester Senior Year
____ Technology 4374
____ Technology 4390--6 hrs. (twice)
____ Technology 4391
____ Geography 3303
____ Physical Education Activity-1 hr.

Note: Students should have received credit for at least two years of one foreign language as part of their high school education. Students graduating from high school after January, 1988 who have not completed two years of the same foreign language are required to take 6 to 8 hours of a modern foreign language as part of the general studies curriculum.

Revised [illegible]

WORKING WITH SENIOR STATE INSTITUTIONS TO ESTABLISH TRANSFER CREDITS FOR VARIOUS DEPARTMENTS AND MAJORS

by

Stephen B. Springer
Director of Occupational Education
Southwest Texas State University
San Marcos, TX 78666
(512) 245-2115

As the national focus continues to shine on efforts to assist students in becoming employable adults in society either through technical education, academic education, or a combination of both, the efforts may be severely hampered or inhibited through ignorance or underestimation of our local districts by senior state institutions. Solutions are explored in the following discussion and methods are included to assist in making productive connections between colleges and local districts.

Essentially, one of the more critical issues is the transfer of credits, through articulation agreements, from high schools or junior colleges to the senior institutions. Senior colleges, both public and private, have long been the bastion of distrust and concern regarding quality emanating from junior colleges and certainly from any high school program. This distrust, although often based on paucity of evidence, has reigned supreme for many years.

Some senior colleges have rebelled against even the idea of transferring credits from a junior college that consisted of technical credits of electronics and other highly specialized fields. To the chagrin of the entering student from a local two-year institution, the credits in his or her major field may indeed be labeled "T&V", or technical and vocational, and not be applied toward the four-year degree. This widespread problem reflects upon the integrity of the junior institution and makes it extremely difficult for the technical individual to combine the technical experience with academic courses to produce a well-rounded and useful degree plan.

The key to solving this major dilemma lies in complex solutions. First, there must be an understanding of the parties involved in this drama. There must be true effort to understand the school districts and junior colleges from the senior college level and vice versa. Certainly, quality standards must be evident in any communication, and there must be realistic support from the top of both organizations. Many problems in this area can be eliminated by the senior management buying into the program.

Lack of administrative support is often hidden by platitudes issued from both superintendents/boards and college administrations. Essentially, the middle level of both organizations are told to address the issue of transfer credits but no real commitment ever takes place. Despite the obstacles, the interested director, principal, or college faculty member must never give up. Instead, the stakeholders should work on gaining a thorough understanding of the obstacles. Therefore, an analysis of the senior college reluctance to accept agreements is a first step to addressing this issue.

Senior colleges are a uniquely governed institution. Some claim to be governed by senior faculty, faculty representatives, or senates. At times this is true. This unique governance can be helpful, yet at other times it may be very traumatic for unaware junior colleges or school district faculty. Once a junior college or a school district wishes to establish an articulation agreement, the senior faculty may indeed keep such an agreement from coming into being. In fact, there are nine points schools and junior colleges should consider prior to doing business with senior colleges. These are as follows:

- It is important that tenured faculty agree to the concepts submitted in any articulation agreement. Junior or untenured faculty, although interested and sympathetic, may not be employed on a long-term basis. Though these individuals approve of the plans, there may not be continuation of the program since these faculty members are, in effect, powerless.
- Institutions move very slowly. Contacts with a senior institution should be made on a continual basis. Districts with quality programs desiring to initiate a transfer agreement need to understand that patience and persistence are extremely important. Because it may take a lengthy period of time to receive an answer does not mean the answer will be negative. Because of budget shortfalls, state institutions may be reluctant to change. If a number of courses are accepted for credit toward the degree plan, sections may be eliminated that could be taught by another faculty member. Therefore, articulations may indeed be a financial albatross for some senior institutions' departments.
- A process of education for the university may be important. Some departments may have never heard of Tech Prep or School-to-Work. Even more serious, they may not have been exposed to any type of dialog on articulations.
- Once a school district or junior college desires to implement some type of course articulation with the senior institution, the initial contact should be made with the president of the university by the highest

officer in the school district or the junior college. Unless this is done, the president of the university may never have an opportunity to "buy into" the agreement. Without the chief executive officer's interest in the concept, it is likely that articulation may take longer to implement, or it may not be implemented at all.

- Contact with the senior institution should always be made with a plan. Once a school board accepts the concept of articulations, the administrative staff and superintendent should strive to have a number of ideas developed including which courses and instructors would be involved in the articulation. In regard to junior colleges, essentially the same process applies. Without an adequate plan from the Vice-President of Academic Affairs (or other appropriate official), various delays may cause numerous problems for the agreements.
- Meetings with the universities should always be made with the idea that these formal times are simply a discussion period. Work must be done ahead in order for the meeting to be effective. It will be difficult to bring back decision makers to discuss the articulations if the meeting has no agenda and no prior preparation has been made.
- The registrar plays an important part in the process. In the discussions with the university it is important that the registrar explain how the articulated courses will be transcripted. Transcription which leaves any doubt regarding the credibility of the courses will simply cause the student problems later on in his or her career.
- Last, the school district faculty and staff who will interact with the university must fully understand the nature of the governance of the university, including the power of the faculty as previously mentioned.

Although these points are not exhaustive or comprehensive in nature, they do demonstrate the valid concerns that must be expressed prior to the negotiation stage for articulations. These are certainly concrete ideas, yet there remain additional subtle concerns that must be viewed prior to enacting the entire process.

History admonishes the reader that senior colleges may have generalized negative feelings that any agreements to utilize credits other than the senior institutions or academic transfer work would be destroying the quality of the institution and lowering standards. This is certainly part of the reason that faculty from senior institutions may look at degree programs in the university which honor such articulations or technical/vocational work with a jaundiced eye. At times only one or two departments may work closely with districts or junior colleges which makes it more difficult for the degrees, which include such work, to be accepted internally.

Another concern can very well be the inflexibility of the senior institution leadership due to the outspoken faculty who see the courses from high school Tech Prep programs as well as junior college technical/ vocational programs as being poor quality and not worthy of consideration. This elitist viewpoint can further be reinforced if the institutions initiating the articulations are not organized and the teachers prepared to dialog with the senior institution faculty on an equal level.

Tied into the senior faculty's concern is the perception that students from high school technical programs as well as junior college programs are not candidates for the senior institutions. Furthermore, according to detractors, credits must be confined to work toward the "Associate level only."

One additional concern raised earlier can continue to reappear in the whole process. This is the fear that senior faculty positions may be lost if too many courses are articulated. With shrinking budgets and the need to employ lecturers to fill the gaps, it concerns senior faculty members if there are potential losses of "semester hour credits." Large entry level classes, the ones normally articulated, generate numerous hours of credit with the minimum cost to departments because junior faculty earning lower salaries teach them.

All of these points must be reviewed and thoroughly discussed once interest arises in the junior college or school district interacting with the senior institution. However, it is important to back up and make certain that the foundation for all of these discussions is addressed prior to discussions with the senior institution. Reluctant or uninformed superintendents can make it difficult for Career and Technology directors in the local district to even begin the discussion toward articulation with the senior college.

Certainly one of the reasons that the articulation can be stopped at the public school level lies in the ever destructive notion that Career and Technology (CATE) courses are the same old vocational education courses of years ago. School counselors and teachers may see the courses as warmed over vocational education where only those who can't go to college are relegated. This damaging perception can continue unless the CATE instructors take proactive stances and seek higher credentials and interact with more professional organizations.

Lack of cooperation between academic and so-called vocational classes on the other hand, creates a gulf which causes continued friction and lack of activity. Schools where physics instructors and auto mechanics instructors interact and work together are simply one example of how the faith of the academic side of the house can be enhanced. This cooperation relies on the CATE instructors to initiate discussions with English, Math, and other subject areas for the benefit of the students in their programs. It is not easy, but it is worthwhile.

At times, the district level CATE director may be invisible or ineffectual in his or her role. It is imperative that this individual continue to interact with top level district administrators as much as possible. This may involve a certain amount of personal and professional risk. However, this needs to happen for the benefit of numerous current students and many yet to come.

A final major obstacle causing great problems in establishing dialog among school districts and senior colleges is the lack of overall district leadership which enables open and free discussion about implementing articulation agreements. If the layers of administrative lines are so confused and devoid of the true desire to change and implement new innovations, it will cause the rapid demise of innovations.

Although this article has centered on some very negative perceptions, especially toward school districts and their work with senior colleges, there remains some elements of hope for those who wish to implement articulations.

One of the best ways to deal with getting information on articulation agreements to the superintendent and board in a closed system is through the Career and Technology program's advisory council. This advisory council, although sometimes simply a rubber stamp, can be a very potent and effective force for educating the superintendent and board. Well-placed business and industry leaders on such a council can carry the news to the upper district echelons even if the assistant superintendents and other levels are not carrying the correct message.

Career fairs are very helpful in bringing together individuals with many talents and contacts which can highlight effective district programs. This "highlighting" process can then build the credibility of the programs that are potential candidates for articulation. Public relations are especially important in career and technology education. Often, programs accomplish numerous academic feats, yet the districts and the public at large are unaware of this program and, therefore, provide limited support.

Local Tech Prep and School-to-Work personnel are very helpful in addressing and following-up with school boards and assisting with the senior college contacts. The more it can be said that there is a good working relationship with a number of entities, the more likely the highest level of leadership will take notice.

CATE directors should continue to forward materials to offices in the district along with a cover memo. Although, the formal chain of communication may block such articulations as well as the Tech Prep program in general, the director must continue to build memo after memo of rationales for justification of the new direction. As indicated before, it is not easy -- yet, no worthwhile educational innovation is generally easy.

Along with these methods of getting the message across, do not forget the main purpose of education -- the students. Programs should always demonstrate how the students in Tech Prep and other articulation agreements are fairing. Students who have made transitions using CATE and Tech Prep in the past are excellent role models to ask to return to the district to provide information for change. Honest evaluation of progress is essential. Programs will only be successful when they can fully change with the times and become not only good, but superior.

In retrospect, we are faced with a host of challenges and sometimes very few tools to overcome these challenges. However, as we become concerned and begin to take action to establish these articulations through our own districts and junior colleges, we must learn to share our ideas and enlist the support of those around us, focusing on strategy rather than recriminations. We must not fear the future, we must welcome the future.

SCANning THE CURRICULUM: TEACHING WORKPLACE SKILLS

by

Pamela Hull
Curriculum Development Coordinator
Instructional Design Division
Richland College
Dallas Community College District
12800 Abrams Road
Dallas, TX 75243-2199
(214) 238-6982

Texas Skills Standards Project. The Texas Skills Standards and Certification Project was initiated in January, 1994, by the Tri-Agency Partnership as a key strategy to improve the quality of technical/ vocational training in Texas. Richland College of the Dallas County Community College District (DCCCD), in partnership with Meeting Professionals International (MPI), was awarded a contract to enhance the Meeting Planning Curriculum by adding necessary workplace skills as identified by the Secretary's Commission on Achieving Necessary Skills (SCANS).

The emerging meeting management profession is essentially an "invisible industry," previously unrecognized as an occupation, but comprised of highly skilled professionals with a U.S. median wage of $37,340 in 1994. Meeting Professionals International has a membership of over 12,000 professionals who are responsible for over one million corporate or association meetings and conventions each year. The typical meeting professional possesses a four-year college degree and has exceptional communication skills, an eye for detail, excellent organizational skills, an ability to work well under pressure, and a working knowledge of the travel and hospitality industry. The Certified Meeting Professional (CMP) is the industry certification for the experienced meeting planner who meets Convention Liaison Council certification standards.

Three other partnerships jointly shared the project contract with Richland and MPI, each with a different occupational area to investigate and develop. North Lake College of the DCCCD and the Dallas Electrical Joint Apprenticeship and Training Committee worked in partnership on the power line installer/construction electrician occupational area; the

University of North Texas, Texas Instruments, and the Electronics Industries Foundation collaborated on the electrical engineering technician occupational area; and, Texas State Technical College-East Texas Center worked in cooperation with the Instrument Society of America on the instrumentation and electrical specialist occupational area. Texas A&M University provided an evaluation team, and the American College Testing Corporation (ACT) provided the Work Keys tool for assessment.

Richland College/Meeting Professionals International Partnership. Richland College of the Dallas County Community College District is the largest higher education institution in Dallas. Richland has a national reputation for quality in educational programming and has a commitment to Continuous Quality Improvement (CQI) principles. The college's Instructional Design Division supports curriculum design while using CQI techniques to identify, explore, define, develop, implement, and evaluate technical curricula which respond to the community's, state's, and nation's critical educational needs.

Workplace Skills. The Secretary's Commission on Achieving Necessary Skills identified three foundation skills and eight competencies which students must acquire in order to be successful in today's workplace. Foundation skills are basic abilities and qualities which students should possess in order to successfully achieve the competencies. By integrating these skills into the curriculum, educators will be able to make courses more relevant for the students.

Foundation Skills:

- Basic Skills (reading, writing, math, speaking, listening)
- Thinking Skills (making decisions, solving problems)
- Personal Qualities (being responsible, having self-esteem,(being social)

Competencies:

- Resources (allocating time, money, materials)
- Interpersonal Skills (working on teams, teaching others)
- Information (acquiring and evaluating data, organizing information)
- Systems (understanding social, technological, and organizational systems)
- Technology (selecting technology, applying technology to tasks)

Meeting Management Courses. Richland College offered Meeting Management training as a continuing education program for approximately five years until the Fall Semester of 1994 when the Travel and Tourism Program included an Associate of Applied Science degree with a specialty in Meeting Management. For the skills standards project, five of the Meeting Management courses were targeted for SCANS enhancement: Introduction to Meeting and Convention Management, Travel and Tourism Marketing, Advanced Meeting Management, International Meeting Management, and Exposition and Trade Show Operations.

Curriculum Guidelines. *Syllabi Guidelines*. Syllabi guidelines were created to assist instructors in the planning and writing of a course syllabus. The guidelines follow the recommendations outlined in *Performance Instruction: Planning, Delivering, and Evaluating* by Daniel E. Vogler, Ed.D. The syllabi guidelines stress the importance of focusing on what the learner will be able to do, in the form of content goals. They also inform faculty on how to identify cognitive, psychomotor, or affective domains. Following competency-based methodology, instructions are included for writing performance objectives. A verb list for content goals and a sample syllabus are included to assist faculty in this task.

Lesson Plan Guidelines. The lesson plan guidelines explain how to develop a lesson plan which relates directly to the syllabus. A lesson plan allows the instructor to be organized and well prepared for the class session. The guidelines give examples of instructional methodology which create a classroom climate conducive to the development of workplace skills in the classroom. A variety of learning activities are included as well as the workplace skills which may be developed through each kind of activity.

Curriculum Enhancement. The development of the enhanced curriculum for each of the meeting management courses required extensive involvement by MPI personnel and total collaboration of all members of the curriculum writing team. The Richland/MPI team analyzed each course to determine the existing levels of SCANS skills. They then compared this baseline assessment to the desired levels, which were determined by an ACT Work Keys profile session. The results are graphically illustrated in a Gap Analysis (see Figure (1)), which shows a direct comparison between the ACT profile results and the baseline assessment. Using the results of the Gap Analysis, the group developed syllabi and lesson plans which reflect the inclusion of workplace skills in all of the courses. Particular emphasis was placed on the seven skills examined in the discrepancy analysis.

Enhanced Syllabi. The curriculum enhancement team used PEAKS CourseBuilding Software by Instructional Performance Systems, Inc. (IPSI)[1] to develop a syllabus for each of the five Meeting Management

---

[1] IPSI is a curriculum development software, formerly known as PEAKS, which includes modules for CourseBuilding, LessonBuilding, and ExamBuilding. For further information, contact Richard A. Pointer, Ed.D., or Daniel E. Vogler, Ed.D., Instructional Performance Systems, Inc., 938 Prairie Center Drive, Suite 130, Eden Prairie, MN55344; (612) 536-1980.

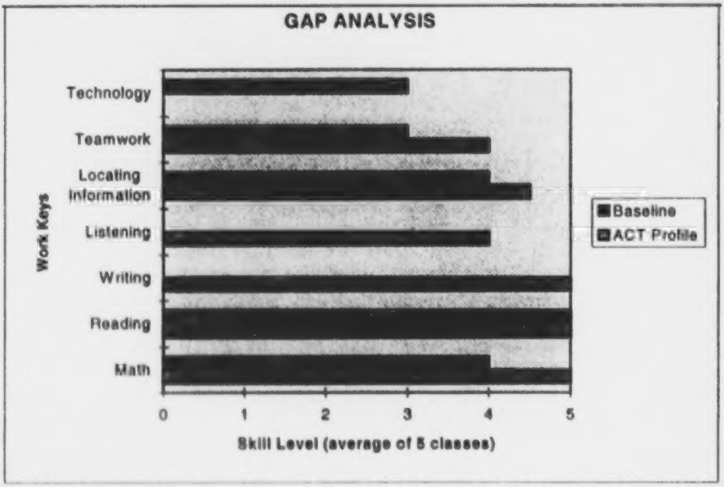


Figure (1). Gap Analysis.

courses. Each course syllabus includes the following sections:

- Content Goals. Using a validated task list for meeting management courses, the Richland staff/MPI team composed the content goals for each course and included specific goals for the attainment of workplace skills.
- Performance Objectives. Competency-based performance objectives were written to reflect the learner outcomes, standards, and conditions for successful attainment of the content goals.
- Student Guidelines. Guidelines were developed for each major classroom assignment to give the students guidance for successful course completion. The appropriate guidelines are attached to each course syllabus.

Enhanced Lesson Plans. Using the Gap Analysis and the ACT Work Keys, the Richland/MPI staff developed lesson plans to enhance each course for the deficient workplace skill levels. Each lesson plan includes a detailed outline for the class presentation. Students are encouraged to develop and apply workplace skills through interactive instructional methods and learning activities:

- Instructional Methods. The instructional methods provide for variety in the classroom to address the different learning needs of the students. Minimum time is allotted for lecture with emphasis placed on the use of class discussions, field trips, group projects and role playing. The lesson plans outline which workplace skills are taught and developed through each instructional method.

- Learning Activities. Varied learning activities are included which give the students hands-on experience and require the application of workplace skills. Most activities involve teamwork as well as individual responsibility. Students actively participate in the learning process through group discussions, teamwork, and individual portfolio assignments. The workplace skills which are required for each activity are indicated in each lesson plan.
- Instructional Materials. MPI personnel conducted a thorough research of available meeting management materials and resources and assembled supplementary information appropriate for each lesson. Applicable meeting planner checklists and informational materials are included with each lesson plan.

Assessments for SCANS Skills. *SCANS Compendium I & II.* In August of 1994, Richland College hosted a two-day Workplace Skills Workshop for DCCCD faculty and staff with Daniel E. Vogler, Ed.D., of Virginia Tech. Dr. Vogler subdivided the SCANS foundation skills and competencies into 42 content goals. With Dr. Vogler's direction and guidance, the participants collaborated on the development of a do/don't list for each content goal. These do/don't lists were packaged as the original SCANS Compendium I for assessment of skills in the affective domain. Richland faculty and staff then took these 42 lists beyond the Skills Standards Project, and the lists were analyzed, revised, reformatted, and rewritten. The final result of these efforts is the SCANS Compendium II, a compilation of the lists for teachers and students to use when developing a class do/don't list for assessment of affective workplace skills. During a class discussion, the students will create a do/don't list by determining what an individual working on a particular skill would or would not do. Students then work on developing that skill over an assigned time period. The student and teacher together decide whether or not the student has mastered the skill.

SCANS Compendium III. Richland staff recognized the need for a cognitive test bank to determine if students have the knowledge base required for the development of workplace skills. Again, we turned to Dr. Vogler for his assistance in expanding the test bank to include the cognitive domain. Dr. Vogler responded by leading two workshops comprised of eight staff and faculty from the DCCCD. The purpose of the workshop was to develop a generic test bank of questions which could be adapted to any curriculum. The charge to the participants was to write cognitive items which would predict whether students have the requisite knowledge for

SCANS skills (life skills). We wanted to determine if students know what they need to know before they can be expected to display SCANS skills.

The skills were divided into eight major areas, the five SCANS competencies and three foundation skills; however, we decided not to develop test questions for reading or math since those areas were already covered by a multitude of standardized tests. The eight areas, each assigned to one of the eight participants according to his/her area of expertise, were: Maximizing Resource Allocations, Using Information Skills, Interpersonal Skills, Using Systems Concepts, Using Technology, Enhancing Basic Skills, Applying Thinking Skills, and Displaying Personal Qualities.

The first workshop included IPSI training on ExamBuilding, with a two-week interval before the second workshop. In those two weeks, each participant developed at least 120 questions in IPSI ExamBuilding related to his/her assigned SCANS skill area. Each participant was responsible for writing approximately 40 true/false or completion questions, 40 matching questions, and 40 multiple choice questions. The true/false and completion questions represent the lowest cognitive level, factual, while the matching questions require a level of understanding; and the multiple choice questions are at the highest cognitive level, application.

During the second workshop, Dan explained that participants in the workshops were exploring uncharted territory, always a difficult task; and he hypothesized that approximately 50 percent of the written test items would be flawed. Subsequently, all tests have been reviewed, analyzed, and revised as the first step in an ongoing process of validation and improvement. The final SCANS Compendium III consists of 42 affective do/don't lists and 800 cognitive test items.

The next step depends entirely on grant funding. We would like to field test the compendium and conduct an item analysis. We would also like to identify norms for SCANS skills to determine an individual's deficiencies and develop corrective training modules. We have applied to several sources for grant funding which would enable us to do the above.

INTEGRATION OF ACADEMICS WITH CAREER AND TECHNOLOGY THROUGH DEVELOPMENT OF COMMUNITY CONTACTS

by
Sarah (Sally) Duke
Health Science Technology Instructor
Richland High School
5201 Holiday Lane East
Ft. Worth, TX 76180
(817) 581-5400, ext. 266

Following a national trend to help students become aware of the relevancy of academic classes, Richland High School initiated a pilot program this year. This program integrated the advanced anatomy and physiology academic science classes with the Career and Technology Health Science Technology (HST) clinical rotation (CR) class. In doing this, the HST program has developed partnerships within the community.

Prior to the implementation of this program, teachers spent two years as active members of the local Tech Prep committee. As instructors, we also served on, and chaired, the RHS campus American Society for Training and Development (ASTD) committee. This group consisted of representatives from the academic science, mathematics, and english departments. Also involved were a HST career and technology instructor and a RHS vocational counselor. Our goal was to identify entry-level requirements for students interested in employment in the health care field. This field was selected because data continues to support that a large percentage of jobs available in North Texas by the year 2000 will be in the health care field. Instructors were linked with a business representative from John Peter Smith, our local county hospital. Following several committee meetings, a tour of selected John Peter Smith Hospital facilities was arranged. There, instructors interviewed department chairs and employees about basic academic requirements for entry-level positions as well as career opportunities within each department. At the end of the evaluation period, instructors formulated methods of adjusting teaching programs in the academic and career and technology departments to make these subjects more relevant to students.

It was determined that the easiest method of implementing the first integration program would be between the science and the HST programs.

These two departments were selected because the science department was already acting as a feeder program for the HST Clinical Rotation class. This support came about when the chair of the science department was encouraged to go with students from the Clinical Rotation (CR) program and observe the HST CR program in action. The chair of the science department and the assigned CR students were able to observe an open-heart surgery in progress. The science department chair was able to see first-hand the application of the principles she taught daily to advanced anatomy and physiology students (A&P). This observation was the impetus of our founding a pilot integration program.

Developing a joint teaching model was our next goal. After much discussion, it was decided that selected students from the advanced A&P classes would be linked with four cluster groups of CR students. Their assignment was to develop a "mock" case-study of a patient with a suspected inferior wall myocardial infarction. Our first step was to obtain permission from North Hills Medical Hospital, our clinical rotation site, for students and instructors not in the CR program to observe at the hospital. We also requested that the BISD Media Technology Department videotape our collection of data at the hospital.

In order to facilitate students whose schedules were not compatible with the CR classes, A&P students were placed on three two-hour field trips. Students were given a written syllabus that outlined their assignment and grade. The project was scheduled for six weeks and was broken down into three major grades: research and preparation of a syllabus; tour and preparation of teaching materials; and two one-hour teaching sessions. Students were divided into four groups by blind draw, and each group was assigned one A&P student. Each of the four groups was then assigned a specific stage to follow during the patient's "mock" journey through the hospital. The patient was followed from admission in the emergency room, until death in the intensive care unit (ICU). For this patient, death, instead of life, was selected so that CR students could demonstrate the skills they had learned through their hospice training. The four departments under study were the emergency room, the cardiac cath lab, the operating room, and the intensive care unit.

The specific assignment given each group was the development of a three-part research project that would conclude with each cluster group teaching a one-hour class two times to RHS science classes. Specific written directions were given to students outlining what materials they needed to gather and how it was to be presented. They were instructed to determine who would be involved with the patient's care and what diagnostic treatments and medications would be used. From this, they developed their first assignment, which was to prepare a written objective and at least ten specific teaching objectives to be used during their teaching presentation. Students had access to the HST computer lab to prepare written reports.

The second part of the program consisted of the A&P students and instructors going with the CR students to the hospital. Using their teaching objectives as guides, the students were to obtain as much information as possible from the individual departments about the treatment of a patient with a possible inferior wall myocardial infarction.

The hospital personnel were very enthusiastic about the program and went out of their way to assist students in collecting necessary data. As each cluster group collected data concurrently, the Media Technology Department filmed sections of each group. Students and instructors brainstormed with the hospital personnel from each department and validated their research information to be sure that it was correct. Students examined the bypass machine and were hooked up to the EKG machines in the cath. lab to get a feeling of what the patient was experiencing. They interviewed ICU nurses to explore their feelings when a patient died and also questioned how the nursing staff would handle the death of a patient. They were given an in-depth description of the equipment, medications, and procedures used during every step of the patient's stay in the hospital. From the information obtained, students were then instructed to prepare a written report (to be submitted with their rough draft) of data collected and to indicate how it would be used in their presentation. Students were responsible for planning teaching materials and were instructed to use at least four different methods of teaching styles. A written test and answer sheet was to be prepared for each class taught, to validate their teaching. Extra-credit was awarded for creativity during the teaching session.

Following the completion of the teaching session, students were requested to submit to the instructors a final written copy of their presentation outlining each student's responsibilities during the teaching session. Students were evaluated by both instructors during the presentations. Their individual grade was an average of both instructors' evaluations. Where appropriate, students were given credit in both programs for their work.

The integration program was viewed as a success by individual students and teachers. The scope of information and the interest level in work performed seemed to be greater than when compared to similar research topics given on an individual basis. The students were able to perform research, do group work, and teach other students successfully in a creative manner. It also demonstrated that the academic and career and technology departments can successfully combine their courses to show the relevancy of applied science.

This integration project was just one of the many new programs developed within the HST program this year. During the first semester, the HST CR program developed a partnership with a local hospice center. The center provided an instructor who came to the classroom to teach students about the concept of death and dying with dignity. Existing HST curriculum was combined with curriculum from the hospice program and students received 27 hours of training. This allowed the students to receive certificates as hospice volunteers. Of those eligible to volunteer, 12 students accrued over 160 volunteer hours, after school, prior to the closure of the hospice center in March of 1996. In the second semester, the hospice program moved to the CR program at Haltom High School, our sister school in BISD. At this time, John McCaa from Channel 8 News began an in-depth review of our program that has been shown on Channel 8 numerous times. A videotape of this production is being shown throughout the state to other high schools, hospice organizations, and several state teachers' conferences to inform others of this opportunity. It challenges high school students to become involved community volunteers through the hospice movement.

In addition to the hospice program, the HST program has been active in a number of community service projects. The HST CR class started a tutoring/mentorship program at a local elementary school as part of their clinical rotation schedule. There, two hours every other week, students work with special-needs students to help them develop basic skills. In addition to curriculum changes that have developed in our program, students in all HST classes have developed a very active community service student organization. Through the Health Occupation Students of America (HOSA) student organization, students have sponsored an annual Thanksgiving canned food drive, adopted Christmas angels, and held yearly blood drives. In 1996, HOSA students added the Anne Simon Reeves Home for Children with AIDS to their community service projects list. What started as a HOSA-sponsored school-wide Christmas Penny Drive for the Home soon became a monthly drive that resulted in over $1,600 collected by HOSA students to provide diapers, prescription formula, playground equipment, and toys for the Home. Students plan on continuing this sponsorship in coming years.

The overall goal for the HST program at RHS has been to show that integration can, and does, work. Programs can expand their scope in many different and creative ways by making use of community organizations and companies to challenge and inspire their students to become active teens. The desired outcome is people who will become lifelong learners and community volunteers.

EPISTECYBERNETICS: A NEW WAY OF THINKING ABOUT DEVELOPING, ARTICULATING, AND EVALUATING TECH PREP CURRICULA

by
Oliver Hensley and Bethany Rivers
SPECAP
College of Education
Texas Tech University
Box 41071
Lubbock, TX 79409-1071
(806) 742-1959

As educators and industry alike strive to build effective and innovative curriculum, they may be overwhelmed by the possibilities and directions each occupational cluster alone could encompass. It is only by careful whittling and much discussion that courses and programs become manageable. Yet, still, is there not a more elemental list of skills that applies to more occupations? Is there a way that the lumbering classes in East Texas could identify commonalties with the metal-working classes on the border? We believe that epistecybernetics is the solution to course articulation problems and to the knowledge explosion and the information glut. Toffler (1970), in *Future Shock*, helped Americans realize the world had entered an information age. Drucker (1992), in "The New Society of Organizations," maintains that we live in a knowledge-based society where knowledge is the primary resource for individuals and the economy.

It is our thesis that as we cross the threshold of the 21st century, the world will enter the Age of Structured-Knowledge, and the first people to adopt the principles of epistecybernetics will dominate their fields of endeavor. Tech Prep stakeholders must understand that teachers and students must learn knowledge stewardship theories if they are to develop state-of-the-art curricula, allowing Tech Prep graduates to be the most knowledgeable technicians in the world and giving regional businesses in Texas a boost in international economic competition.

The educationists and the disciplinarians have been philosophically at war with one another for years. The divergence in thinking is enormous and results in the lack of cooperation in knowledge development between the groups. There is almost no disciplinary knowledge articulation between the public schools and the universities.

Professional educationists do not yet have a plan for effectively organizing and articulating knowledge, and the disciplinarians do not give knowledge stewardship their professional attention. Tech Prep is one avenue by which this problem can be solved, using curriculum advisory committees. The Tech Prep directors have made a conscious effort, through the creation of advisory teams, to determine where professionals interested in teaching knowledge content could meet to develop theory for the efficient and effective dissemination of structured knowledge and could engage in disciplined thinking, the type of thinking that allows one to solve professional problems.

Epistecybernetics is the only discipline with the mission for improving the efficiency of knowledge structuring and dissemination. It is a vital mission that will help Tech Prep students in all programs to individualize their learning by selecting disciplinary validated knowledge elements from functionally organized knowledge registers maintained by discipline experts.

Working closely with teachers and practitioners, an epistecyberneticist's primary responsibility is to analyze and create models of functionally organized knowledge systems, to be validated by a congress of international experts. This article introduces some fundamental ideas about the conceptual foundations needed to study the nature of knowledge in an age of structured knowledge, reviews the progress of the new discipline of Epistecybernetics, and considers this knowledge in the context of Tech Prep, and advancing curriculum development and articulation.

Today the glut of information is the root of a number of very serious difficulties in contemporary society not being addressed by conventional systems. While Tech Prep stakeholders speak very little about information overload, every professional is concerned about its impact on their work, as new information overwhelmingly accumulates. It is a particularly serious problem for Tech Prep curriculum designers who can no longer limit their knowledge scans to their primary discipline, but must survey the complementary disciplines as well.

The ultimate solution is to develop a discipline for the study of the stewardship of knowledge. Epistecybernetics is a new discipline with a broad purview, and a particular interest in Tech Prep curriculum problems. The term epistecybernetics comes from the Greek words "episteme," meaning knowledge, and "kybernetes," meaning pilot or governor. It is a new word, intentionally selected to convey the idea that man must govern knowledge or be frustrated in a chaos of ataxic concepts. Upon careful consideration of the present status of knowledge in our society, it is apparent that scholars must somehow provide better stewardship of knowledge and that this direction could and should lead to a new way of thinking about knowledge, allowing us to build knowledge structures which can systematically store the natural deluges of information and knowledge that currently flood our present communications systems.

The more quickly we can innovate, the greater our advantage in any competition. The faster we can obtain knowledge, the better our learning, the more efficacious our practice, the earlier our innovation, and the stronger our competitive edge. We hold that those organizations with the ability to functionally structure knowledge will lead in the education of their workers and the development of their fields. Tech Prep curriculum development specialists who learn epistecybernetic principles and apply them to their curriculum will place their programs at the forefront of education. If our Tech Prep students adopt epistecybernetic principles, they will lead in later life, owning and governing knowledge individually, making them preeminent collectively.

Knowledge may be the most significant theoretical and practical term used by man, yet most scholars and practitioners have not adopted a definition of knowledge that distinguishes it from similar phenomena or describes its essence.

The epistecybernetic definition of knowledge is "*the acceptance of a generic solution into a repertoire of problem solving devices.*" Generic solutions are necessary end products for knowledge. Therefore, the problem solving processes must be carefully considered. Briefly, this process begins with *problem* definition, continues with asking the *right* questions, pursuing the *proper* inquiry, and discerning the appropriate *generic solution.*[1]

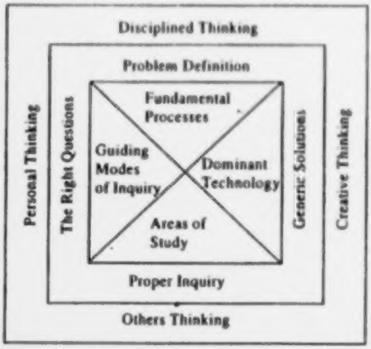


Figure (1). The Generic Model for Structuring Knowledge

---

[1] For a more thorough explanation, the reader should see Hensley's 1996 *Epistecybernetics: A New Approach to Knowledge Stewardship.*

The Structure of Knowledge Model. Hensley and Fedler (1993) first identified four major knowledge dimensions for all structure of knowledge models. Since that time, Hensley has added to the generic model the complementary dimensions of problem solving and thinking (Figure (1)). Your authors maintain that a structure of knowledge for a discipline can be developed if the epistecyberneticists (Tech Prep curriculum development specialists) will believe that every professional performs work on a species of objects, which will define the major study areas of the discipline. The professional performs a set of fundamental processes on the objects, using certain appropriate technologies (instruments), and selecting particular modes of inquiry (ways of thinking about a particular problem) to study the target problem. In the workplace these operations are inextricable, but for espistecybernetic purposes, the quadrology of knowledge dimensions must be distinguished to help us understand their epistemological and pragmatic roles. Since epistecyberneticists use a general systems mode of inquiry, it is important to model the entire system and to identify the major components and processes of the system.

This article has the purpose of bringing together two sets of educational philosophies and practices for the advancement of Tech Prep education. We have briefly explained epistecybernetics and its powerful innovations, and we feel that the contents of this monograph, *The Texas Tech Prep Consortia: Strategies for Advancing Technical Education,* provide a fair overview of Tech Prep education in Texas. Now, it is time to consider briefly the SPECAP investigators analysis of existing Tech Prep curriculum development processes and to consider how Tech Prep curriculum development specialists can adopt epistecybernetic principles to more effectively develop Tech Prep programs and courses.

The last section of this article, the nine stages for designing and validating a structure of knowledge model for a Tech Prep program, will discuss how Tech Prep curriculum development can benefit from the use of epistecybernetic principles and models. Figure (2), Design and Validation of a Structure of Knowledge Model is probably the most important model in this article because it shows the great complexity involved in creating and validating any new curriculum. Collectively, the model explains the tremendous amount of development, articulation, and evaluation needed to install modern Tech Prep programs.

The Nine Stages for Designing and Validating a Structure of Knowledge Model for a Tech Prep Program. *Stage 1. Can A Model of the Structure of Knowledge (SOK) for a Discipline be Created?* In the first stage of creating a model, the Tech Prep curriculum development specialist must make the decision to construct and validate a discipline-wide systems

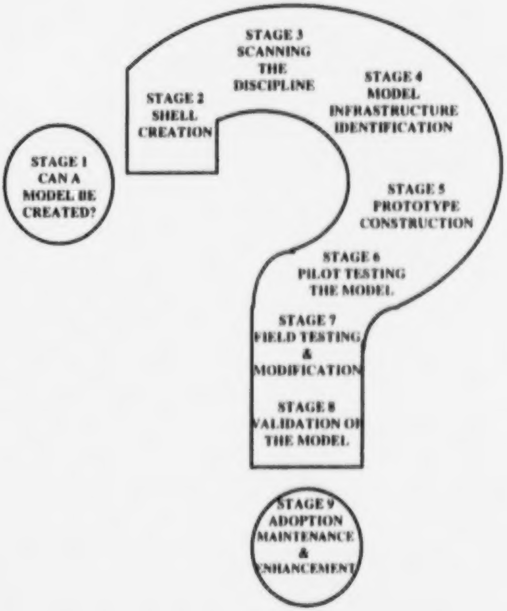


Figure (2). Design and Validation of a Structure of Knowledge Model

model. The aspiring modeler asks him/herself the question: Can I model the totality of the knowledge used by a specific professional group by placing it in a form that shows the basic knowledge disciplines and their purposeful and teleological relationships in this discipline?

Like an epistecyberneticist, the stakeholder must think for an extended period about what they know intuitively about their discipline. The Tech Prep stakeholder must create a number of mental products: *program questions*, *possible processes* for inquiry, and a tentative *mental model* of the solution with the intent of developing a specific structure of knowledge model for that particular discipline.

Stage 2. Shell Creation and the General Model. In the second stage, the Tech Prep stakeholder must create a Shell Model of the discipline. The reason to use a visual model is to instantly clarify a complex set of thoughts and to provide a common image for discussion among the Tech Prep stakeholders. The General Model is an outline of knowledge of the discipline pasted on the geometric form. The Shell Model can be any shape. Some curriculum development specialists spend considerable time searching for a unique shape to represent their discipline. A cube is a good beginning because it shows the primary components of a structure of knowledge and their interrelationships, such as those shown in Figure 1.

Stage 3. Scanning the Tech Prep Environment, the Discipline and the Universe of Knowledge. The intent of a Tech Prep environmental scan is to identify the educational and occupational needs of the region. The purpose for scanning the environment is to determine the knowledge elements associated with the particular discipline of study contemplated, to determine others responsible for organizing knowledge in the discipline, and to find a group of experts who will critique the model for validity, completeness, and usefulness.

Stage 4. The Epistecybernetic Model and Theory Applied to Tech Prep. Identifying and arranging the various components of the infrastructure into a complete model is a difficult task, because the arrangement must be made in accordance to the classification scheme that reflects the interdimensions of knowledge in the Tech Prep discipline analyzed, and demonstrates the level of precision appropriate for that knowledge. Sixty-five percent of the general model is done when Stage 4 has been completed. It is important to remember that when discussing a finished and complete model, it is an end-product of a stage of a more encompassing work in progress -- one that takes many months and many hours of disciplined thinking. Creating the classification titles and arranging the model components requires between 200 and 1600 hours of work. Tunstall (1993), who created a Model of the Structure of Knowledge for Mathematics, estimated that he spent more than 27 months to complete this stage.

Stage 5. Prototype Construction. The purpose of the Tech Prep prototype is to test the first draft of the complete model of a Structure of Knowledge by obtaining a critique of the model from the Tech Prep curriculum committee members. At this stage, the modeller has effectively, through the model, established the boundaries of the discipline the modeller is studying , and has represented that level of detail in the model.

Stage 6. Pilot Testing the Tech Prep Prototype Model. The purpose of this stage is to provide the modeler with feedback about the efficacy of the Tech Prep curriculum development design, gather input on the design from consularies, and validate the instrument.

Stage 7. Field Testing and Modification in the Regional Consortium. The purpose of field testing is to determine if the validation instrument is reliable, suitable, and effective in accomplishing Tech Prep objectives. Moreover, field testing should overcome the parochialism inherent in the past stages. At this stage, the modeller should have a complete detailed narrative account that also helps the buy-in of the model.

Stage 8. Validation of the Tech Prep Model. At this time, the curriculum specialist must have the model validated in some fashion by the experts in the field, to guarantee that the model accurately represents the discipline and will guide curriculum development in the region.

Stage 9. Maintenance and Enhancement of the Tech Prep Structure of Knowledge Model. The final stage of development for epistecybernetic models requires that an individual or expert group assume the maintenance of the model (and sussequent registers), to keep pace with expanding knowledge and changing times. In the case of Tech Prep Structure of Knowledge Models, one appropriate organization would be the Tech Prep Directors' Association of Texas or the particular disciplinary agency with responsibility for licensure and/or accreditation in Texas.

Epistecybernetic evaluation techniques have great value beyond Tech Prep, for they provide the primary disciplines with a method to allow a quick determination of comprehension of basic knowledge components of their discipline. This is a giant step forward for curriculum development professionals, test makers, and textbook authors. Epistecybernetic theory will also enhance the development of common epistemological terminology across disciplines and promote the use of agreed-upon standards for knowledge organization, transfer, and credentialing -- a very important concern for all Tech Prep stakeholders.

All of this structure of knowledge building at first seems abstract and confusing. In application though, it quickly becomes clear how useful it can be. Accordingly, the next article is a specific example of a knowledge register for calculus, designed to more efficiently and teleologically teach, and evaluate, calculus. Sounds like the purpose of Tech Prep.

References

Drucker, P. F. "The New Society of Organizations." *Harvard Business Review.* September-October 1992: 95-104.

Harmon, P., R. Maus, and W. Morrissey. 1988. *Expert Systems, Tools, and Applications.* New York: John Wiley & Sons, Inc.

Hensley, O. D. and C. B. Fedler. "Restructuring Engineering Education At Levels More Precise Than Degrees and Courses." in the Proceedings of Gulf-Southwest Section Annual Meeting of American Society for Engineering Education. *The Ideal Education Program for Engineering and Technology: What Is It and How Do We Get There?.* Albuquerque, N.M: The University of New Mexico, College of Engineering. March 15-17, 1992.

Hensley, O., C. B. Fedler, P. M. Tunstall, and P. H. Sisler. "Moving Engineering Education into an Age of Structured-Knowledge," in Ronald E. Barr, *ASEE 1893-1993: Shaping Our World-Century II*, Proceedings 1993 Centennial Meeting of the Gulf-Southwest Section of ASEE, Austin, TX: University of Texas, April 1-2, 1993. pp 128-137.

Hensley, Oliver D., C. B. Fedler, and D. J. Bagert. 1996. *Epistecybernetics: A New Approach to Knowledge Stewardship* Lubbock, TX: International Society for Epistecybernetics.

Toffler, A., 1970. *Future Shock*. New York: Random House.

Tunstall, P. M. Jr. 1993. *The Structure of Knowledge for Mathematics.* Ed.D. diss., Lubbock, TX: Texas Tech University.

THE CALCULUS KNOWLEDGE REGISTER FOR TECH PREP

by
Peter Sisler
College of Education
Texas Tech University
Box 41071
Lubbock, TX 79409-1071
(806) 742-2329

> *After an unbroken tradition of many centuries, mathematics has ceased to be generally considered as an integral part of culture in our era of mass education. The isolation of research scientists, the pitiful scarcity of inspiring teachers, the host of dull and empty commercial textbooks and the general educational trend away from intellectual discipline have contributed to the anti-mathematical fashion in education. It is very much to the credit of the public that a strong interest in mathematics is none the less alive.* (Courant, 1953)

Calculus has suffered mighty criticism lately, and the mathematical system of education in general needs a little help. Courant, I believe, is not criticizing individuals or their roles in the above quotation, but he is criticizing education and other systems and how they interact to turn technical students into mathematical problem solvers. He addresses teaching, textbook production, and research systems in this diatribe against the mathematics educational system as a whole.

He praised the public for not giving up forty years ago; what might he think today? Like a dying ecological system, our educational system has repeatedly not produced the new generation of mathematical adepts among the citizenry that it should. It is true that the mathematical system is within other systems or affected by them: the school systems, general educational systems, and political systems at all levels. Each of these systems in turn is profoundly restricted by their environment composed of national and world cultures.

I am not about to analyze these supersystems or cultures, but instead I shall describe a small, systematic step toward the solution. This step is to articulate the Basic Knowledge Register for Calculus. This paper outlines the initial stages in the process of establishing a validated calculus register of basic knowledge elements. I use the young science of epistecybernetics to guide my procedure.

Epsistecybernetics, the science of knowledge stewardship, has several definitions. Oliver Hensley (telephone interview, February 23, 1996) distinguishes *knowledge* from *information* and *facts* and divides knowledge into atoms he calls *Knowledge Elements* (KEs). He defines a *Basic Knowledge Element* (BKEs) as a problem-solving device accepted in the repertoire of a discipline. The *Structure of Knowledge* for a discipline is a model ordering areas and subdisciplines to show a totality of major areas in a field of study (Tunstall, 1993). The Structure of Knowledge for a subject area within a discipline is the pictorial model of the arrangement of the BKEs. The concept of systems is a basis for the arguments in this paper and for epistecybernetics. A *system* is a bounded entity surrounded by an *environment*. The system interacts with the environment -- that is, has *input* and *output*. The system has a set of self-regulating and self-correcting processes selected according to its present input or its current state. Tunstall (1993) has provided a Model of the Structure of Knowledge for Mathematics as a whole. He has divided the knowledge of mathematics into four areas. One of these areas is Analysis; within Analysis is Calculus. Epistecybernetics is the scientific study of the entire knowledge stewardship system of which calculus is a small part. As they occur in context I will add a few particular terms.

I will now describe the development and use of the register for calculus under two major sections: Register Development and Register Usage.

Register Development. I began my study by making a long list of knowledge elements that were in any way related to calculus. Next, I attempted to structure lists without convincing success, until I resorted to pictorial models which directed me toward the proper structure. Finally, in the last operation in the initial process, I verbally (as opposed to notationally) described each knowledge element. This verbal operation guided me remarkably well in critiquing my own work and selecting, transferring, or rejecting individual knowledge elements. Those of you who have ever used a *Writing to Learn* program will not be surprised at the power of verbalization, even in mathematics.

Do not think that the development of a register of knowledge is a simple, linear process. It is not. I initially poured out a list on paper. Then I tutored and taught calculus students, checking their reactions and studying their textbooks. I grouped the elements in a flat and somewhat homogeneous structure. Then I restructured the elements back and forth several times until I realized that there may be ambiguity, and that I must choose an optimal structure. This year I began to use pictorial models and verbal articulation. Even at this stage I would test my options between the model and list structure until both fit together according to my verbalization of the knowledge elements. It is a fascinating process but not a linear one. I hope that my description will save those of you who decide to build a register a good deal of time. It may be that the construction of a protean pool is an essential step in the construction of a register but it may not. In comparison, see a description of the one-page model used for validating system models (Hensley and Tunstall, 1994; Sisler and Hensley, 1994).

The Protean Pool. The Protean Pool of Knowledge Elements for Calculus contained 264 knowledge elements. I have since whittled that number down to 178 basic knowledge elements with the help of models. The protean pool of knowledge elements are not basic to calculus but they are useful to the subject, in the directions of both application and theoretical understanding. From the protean pool I intend, in future research, to extract elements for a humanities or liberal arts calculus and a finite calculus for technical students. My pioneering effort on the protean pool of knowledge elements, with foresight might have been avoided for the immediate problem, but the effort is not wasted in the long term.

An Extract from the List of the Protean Pool of Knowledge Elements for Calculus

Knowledge Structures
Structure of Knowledge for Mathematics (Tunstall)
Mathematical Models
The Major Processes in Mathematics (Tunstall)
The Universal Problem-Solving Process in mathematics
The Formal Solution to a mathematics problem
The Real Number System
The Rational Numbers
Zeno's Paradox
The Dedekind Cut
The Axiom of Continuity and Godel's Theorem
The Axiom of Continuity and Cohen's Theorem
Rectangular Coordinate Systems
The Two-Dimensional Rectangular Coordinate System
The Two-Dimensional Rectangular Differential Area Element
Conversion to the Polar Coordinate System
The Three-Dimensional Rectangular Coordinate System

The Major Model. The Major Model for the Basic Knowledge Elements of Calculus shown on the next page pictures the overall groupings or *structure* of the basic knowledge elements. Each of the boxes in the major model are expanded further into sub-models which I have not the space to include here. As a developer, the models provided me with the picture of how the knowledge elements are related. Under Register Usage you will also see how faculty, Tech Prep students, and graduates may use the models in practice, too.

The Major Model Of Basic Knowledge Elements For Calculus. The major model, shown in Figure (1), depicts the background of the Real Number System, the foundational Limits, and the splitting into both discrete and continuous infinite processes. The discrete processes are Sequences, Series, Power Expansions of Functions, and Riemann Integral. The continuous processes are Continuity of Functions, Derivatives, and Antiderivatives. Note the cross-over link of Derivatives to Power Expansion of Functions. The discrete and continuous infinite processes merge together in the Fundamental Theorem of Calculus. The Stieltjes Integral ties together the Power Expansion of Functions, the Riemann

1996 copyright
Peter Sisler

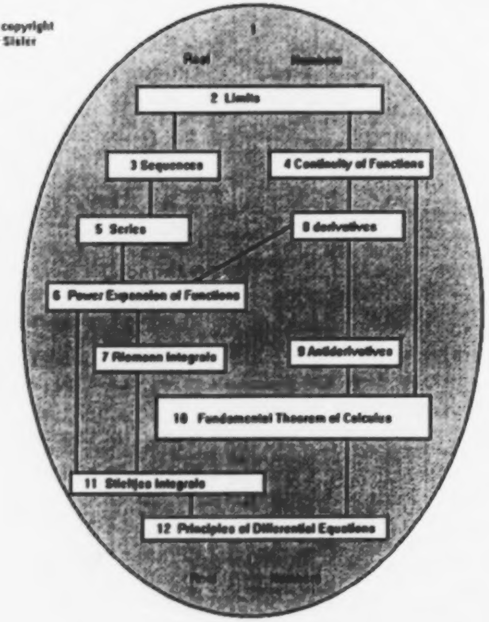

1
Real
Numbers
2 Limits
3 Sequences
4 Continuity of Functions
5 Series
8 derivatives
6 Power Expansion of Functions
7 Riemann Integrals
9 Antiderivatives
10 Fundamental Theorem of Calculus
11 Stieltjes Integrals
12 Principles of Differential Equations
Real
Numbers

Figure (1) The Major Model of Basic Knowledge Elements for Calculus

BEST COPY AVAILABLE

Integral, and the Fundamental Theorem of Calculus. The Principles of Differential Equations knowledge element culminates and generalizes the differential and integral calculus. These 12 elements in the major model point to 166 more knowledge elements for calculus.

The Structured Register List. I have here a small extract from the 178 basic knowledge elements in the list for the calculus register. The list features an indented structure and the major sections, those with single digit numberings, correspond to the major model discussed previously.

Outline of the List of Knowledge Elements in Calculus Register

1. Real Numbers
  1.1 Axiom of Continuity
    1.1.1 Density of Rationals
      1.1.1.1 Dedekind Cuts
    1.1.2 Least Upper Bound Property
      1.1.2.1 Order Completeness
    1.1.3 Surreal Numbers
      1.1.3.1 Infinitesimals
2. Limits
  2.1 Limit Invariant Operations
  2.2 Indeterminate Limits
    2.2.1 Infinite Limits
    2.2.2 Limits at Infinity
    2.2.3 Ambiguous Limits
  2.3 One-sided Limits
3. Sequences
4. Continuity of Functions

The Criteria for Determining Basic Knowledge Elements in Calculus. A typical calculus text is designed as a learning tool for calculus students rather than a reference tool. The calculus text is not even a definition of the basic knowledge. The text will often include chapters or sections on earlier topics from algebra, analytic geometry, or trigonometry. Often too, the calculus text will include later topics in differential equations, advanced calculus, or higher analysis. Textbooks may also include examples, exercises, diagrams, and historical anecdotes which are *information* about calculus but not necessarily the *knowledge* of calculus.

These criteria are general guidelines meant to summarize my considerations in selecting basic knowledge elements. The criteria cannot be absolute since the absolute authority for the validated Basic Knowledge Elements is the consensus of the surveyed mathematical experts.

The Basic Knowledge Element. The fully operational register for calculus will describe each basic knowledge element, not only verbally as I have done, but also in formal notation. In addition, each basic knowledge element will contain other mandatory and optional entries describing histories, and related elements, providing examples and exercises, stating statistics on average times and efforts for mastery, and models as needed (Sisler, 1994).

Criteria for Determining Basic Calculus Knowledge Elements

Positive Criteria	**Negative Criteria**
generic solution in calculus	particular solution for one case
generic application in calculus	extra-disciplinary application
complete within calculus	found complete in earlier mathematics
theorem statement useful	theorem statement irrelevant to calculus
proof of theorem	proof using higher analysis or geometry
proof of major lemma or theorem	split a theorem by dividing the unifying concept
expeditious algorithm	ad hoc algorithm
operational algorithm	variation of a general procedure
formal model of calculus structure	model which distorts calculus structure
disciplinary heuristic	idiosyncratic or mnemonic heuristic
canonical calculus object like e^x	ordinary example
canonical counter-example	trivial counter-example

Register Usage. Mathematical registers will be as useful as a dictionary once they are known and accepted by the technological practitioner. The registers should be easily installed on computer systems for efficient access. They will be useful for faculty, test writers, and students in the following anticipated ways.

Faculty Use. The Registers will form an accepted standard validated by a consensus of the expert mathematicians around the globe. As a standard, the registers of knowledge elements will define articulation agreements, measure standardized tests, and eventually specify student performance more precisely than course levels.

Articulation. The mathematics registers will be globally validated by each individual basic knowledge element not by course. As a consequence, there will not be the problem we have today of deciding whether courses are equivalent if the topics listed on the syllabus are not exactly alike. Articulation will be clear at the knowledge element level. State boards will likely adopt the register articulation since they will not need to compromise between the flagship institution and the other higher education institutions in the state. The register would have already been validated by the flagship faculty and their peers worldwide.

Standardized Tests. Standardized tests will follow the specifications in the knowledge register. Once the registers are universally accepted by educational systems and the technological practitioners there should be less need of standardized tests.

Student Records. Student transcripts should eventually reflect the knowledge register usage by specifying knowledge element mastery rather than course mastery. Then, students will not have to take a course if they have already covered half the material, or worse, be responsible for picking it up on their own. Eventually, leveling courses or remedial work will be based on sets of knowledge elements rather than on courses. Incoming freshmen or transfer students will face the exact amount of work they need to prepare for their career goals.

Advanced Placement Exams and College Placement Tests for Mathematics. The writers and proctors of these exams will have a fair yardstick to evaluate their test instruments. Eventually, with widespread adoption, the test instruments themselves will no longer be necessary.

Independent Study. The provision of the math register will provide an automatic set of tailor-made material for guided independent study. The knowledge elements needed for the student's course of study may be exactly determined and a coach may guide students through their individualized set of knowledge elements.

Practitioner Use of the Computerized Register. The technological student will soon be a practitioner and the practitioner, old or new, will find the register as useful as a dictionary. The pictorial model will provide an easy conceptual vehicle for the location of the knowledge element needed to solve the problem at hand. This will be especially true when the register is installed on a computer network. With the pictorial model already in the register design, it is natural to install the register with a graphical interface for fast examination. Several windows of knowledge elements may be examined, compared, and selected or eliminated for the appropriate solution to the problem at hand.

Conclusion. There are several members of the International Society of Epistecybernetics (ISE) and several publications on expert systems and validated models available to help you create a mathematics, science, or engineering knowledge register (Harmon, Maus, and Morrissey, 1988; Hensley and Fedler, 1992; Tunstall, 1993; Fedler, Hensley, Sisler, and Tunstall, 1993; Hensley, Fedler, Tunstall, and Sisler, 1993). The exponentially expanding needs of our technological society necessitate the establishment of a global network of knowledge registers at the elementary level for calculus, mathematics, and other supporting disciplines such as physics and English.

References

Courant, R. 1953. Foreword to *Mathematics In Western Culture*. Kline, M., Au. New York: Oxford University Press.

Fedler, C. B.; O. D. Hensley, P. H. Sisler and P. M. Tunstall, Jr, 1993. "Epistecybernetics: a New Approach to Restructuring the Engineering Curriculum." in *Proceedings: 1993 Centennial Meeting of the Gulf-Southwest Section of ASEE*. Vol. I. American Society for Engineering Education.

Harmon, P., R. Maus, and W. Morrissey. 1988. *Expert Systems, Tools, and Applications*. New York: John Wiley & Sons, Inc.

Hensley, O. D. and C. B. Fedler. "Restructuring Engineering Education At Levels More Precise Than Degrees and Courses," in the Proceedings of Gulf-Southwest Section Annual Meeting of American Society for Engineering Education. *The Ideal Education Program for Engineering and Technology: What Is It and How Do We Get There?* Albuquerque: The University of New Mexico, College of Engineering. March 15-17, 1992.

Hensley, O. D., C. B. Fedler, P. M. Tunstall, and P. H. Sisler. "Moving Engineering Education into an Age of Structured-Knowledge," in Ronald E. Barr, *ASEE 1893-1993: Shaping Our World-Century II*. Proceedings 1993 Centennial Meeting of the Gulf-Southwest Section of ASEE. Austin, TX: University of Texas. April 1-2, 1993: 128-137.

Hensley, O. D. and P. M. Tunstall. 1994. *A Schematic of the Process for Validating System Models*. Hensley office files, College of Education, Texas Tech University. Photocopy

Sisler, P. H. 1994. *The Calculus Knowledge Register: A Teleological Structure*. Presented at the second meeting of the International Society for Epistecybernetics, Lubbock, Texas.

Sisler, P. H. and O. D. Hensley. 1994. The Development of a Validated Calculus Register Using a Consensual Expert Systems Approach. *Proceedings of the fifth annual conference of the Artificial Intelligence and Expert Systems Society.*

Tunstall, P. M. Jr. 1993. *The Structure of Knowledge for Mathematics*. Ed.D. diss., Texas Tech University, Lubbock, Texas.

CREATING AN INFORMATION, MARKET-DRIVEN EDUCATION AND WORKFORCE DEVELOPMENT SYSTEM: THE ROLE OF LABOR MARKET AND FOLLOW-UP INFORMATION

by
Richard C. Froeschle
Executive Director
State Occupational Information Coordinating Committee
Travis Building
3520 Executive Center Drive, Suite 205
Austin, TX 78731
(512) 502-3751

The dynamics and relationships within an education and workforce development system are complex and involve many different participants. These relationships include those between students and schools, between government training programs and eligible participants, between employers and new employees, between local service deliverers and state and federal oversight and administrative bodies. Indeed, there are so many independent "sub-systems" that the entire process of education and workforce development seems far too vast to view as a single, integrated system.

In fact, however, each of these relationships comprise an important link and a substantive role in educating our citizens and putting them to work. The necessary pieces already exist; but our way of conceiving them, connecting them and improving them within the context of a single system becomes the real challenge. This article proposes a theoretical construct for a fully integrated market-driven education and workforce development system (EWFDS). There is a role defined for each stakeholder both as recipients of information and as producers or drivers of information. Figure (1) is the graphic depiction of this system.

As with any sound theoretical model, there is a paradigm and several important principles upon which this system is based. The paradigm offered here is that these disparate relationships can fit together into a single system which responds to and is driven by needs of employers and the labor market. Moreover, this system is not a series of independent linear processes. This is a recursive system which "understands" where it succeeds and fails through comprehensive customer follow-up, learns about changes in the external environment such as changing labor market conditions, and builds upon

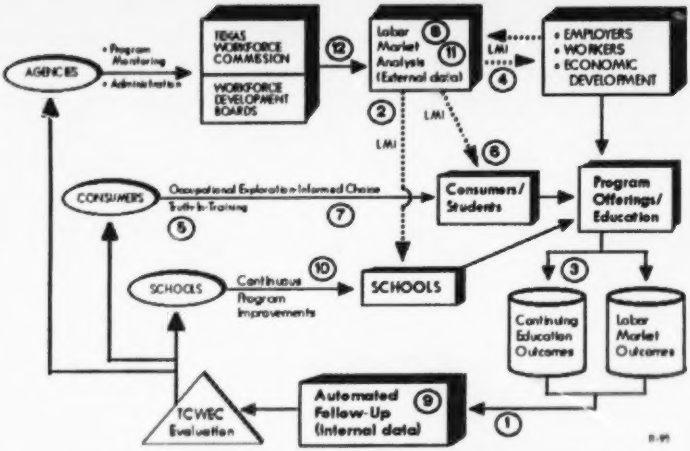

AGENCIES
• Program Monitoring
• Administration
TEXAS WORKFORCE COMMISSION
WORKFORCE DEVELOPMENT BOARDS
⑫
Labor Market Analysis (External data)
⑧
⑪
LMI
④
• EMPLOYERS
• WORKERS
• ECONOMIC DEVELOPMENT
②
LMI
LMI
⑥
CONSUMERS
Occupational Exploration-Informed Choice
Truth-In-Training
⑤
⑦
Consumers/ Students
Program Offerings/ Education
SCHOOLS
Continuous Program Improvements
⑩
SCHOOLS
③
Continuing Education Outcomes
Labor Market Outcomes
TCWEC Evaluation
Automated Follow-Up (Internal data)
⑨
①

Figure (1) Information Driven Workforce and Education Development System Role of Labor Market and Follow-up Information

this information to institute a process of continuous program improvement.

Guiding Principles: Foundations of a New Model. The principles and philosophy of operation are simple, yet when implementing major change there should always be a set of unwavering principles that guide program operations. This model has five basic philosophical tenets that provide the foundation for an information-driven education and workforce development system.

1. The people responsible for providing education and training services are dedicated professionals who want to improve the quality of service. Although many of these people have been functioning within a more traditional linear model, each of them is more likely to adapt their actions and behaviors if they understand the process of continuous program improvement and the role they could play to achieve it.
2. The strategic planning process is a critical component in creating a market-driven system. It must be taken seriously by local education and workforce development service providers, reviewed regularly, and adjusted to reflect any new knowledge about a changing external environment.
3. In order for a system to learn and adjust, it must have access to comprehensive customer follow-up information. It is impossible to build and improve on program success and eliminate disappointment if success is not defined within the operational plan and information is not collected to measure and identify its occurrence. Only through detailed outcome information can a process of continuous program improvement be successfully implemented.

4. Customers are not taken for granted. They are valued and informed contributors and drivers of the system. This system is built on the notion of truth-in-training and informed choice. Customers are provided access to information about the labor market and about the performance outcomes of individual schools and programs. Armed with an inalienable right to know and access to the same key labor market information that schools and government agencies have, consumers directly influence the types of training programs that are made available by the system.
5. State and local government agency partners have a role in providing information, establishing reasonable benchmarks and standards for progress, administrating program funding, monitoring progress and providing training and technical assistance to assure improvements and promote best practices. Other than these roles, program decisions should be made as close to the customer as possible following principles of site-based management and local control.

Understanding Information Flows: Strategic Planning. Given these foundation principles, it should be clear that this market-driven system has two major points of focus; 1) comprehensive strategic planning and, 2) comprehensive outcomes follow-up. Since the model is recursive, it really does not matter where the discussion begins. However, since the process of program planning itself is more linear, let us begin with the strategic plan.

The strategic plan for an education and workforce development system is the heart of the system. If one agrees that the role of an EWFDS is linking the education and training of our citizens to employment opportunities in local and regional labor markets, then the more one knows about those external labor markets the easier will be the subsequent match. A major part of any strategic planning process should require training providers to:

- Learn as much as possible about the current structure of regional industry and occupational employment including market condition assessments by incumbent workers and regional employers.
- Learn how current employment will most likely evolve over time, what factors will influence change, and what sectors will emerge or evolve in the future.
- Learn how other community developments will affect this change (e.g. changing demographics, economic development efforts etc.) and how they will be accounted for.

By understanding and, as importantly, communicating knowledge about the external economic environment, both schools and consumers can help shape education and training program offerings. Clearly, without an articulate assessment of regional labor market dynamics, any attempts to provide appropriate skills training or meet employer hiring requirements will be random and haphazard. Moreover, the lack of a strategic plan gives rise to the adage, "It is impossible to know you have arrived, if you didn't know where you were going in the first place."

Comprehensive Outcomes-Based Follow-Up. If strategic planning is the heart of the system, perhaps comprehensive outcomes-based follow-up is the soul. Studying the labor market is more a practice of understanding human behavior than it is an exact science. As such, despite our best efforts, there are no guarantees of success. For a system to learn and grow and for its caretakers to implement a process of continuous program improvement, it must know where it succeeded and where it failed. A comprehensive follow-up system is that vehicle.

Program follow-up is not new in either theory or practice. This model however takes a different twist to standard follow-up. First, if there is to be a fully integrated education and workforce development system, there must be a mechanism to account for all program participants. This mechanism has four basic requirements:

- It must be cost-effective. While traditional survey techniques can yield reliable data, any attempt to incorporate existing administrative databases to save costs is desirable.
- It must provide feedback based on statistically sound principles and practices to assure the highest degree of both data quality and integrity and inspire the highest degree of confidence by the users.
- It must cover a critical mass of potential labor market and continuing education outcomes. The workforce is highly mobile and the world offers many opportunities. Although it is foolish to think that every outcome could be identified, it is important to capture the vast majority of possible outcomes.
- The results must be accessible to all stakeholders in the system. To collect outcomes information and not share or communicate the knowledge it provides is no different than not having collected the information at all.

The Texas Student and Adult Learner Follow-Up System, which uses record linkage techniques to administrative databases, provides cost-effective outcome information for use by all system stakeholders. Moreover, the Department of Labor/Employment and Training Administration (DOL/ETA) has commissioned the Texas SOICC to create a Consumer Reports System (CRS) so that this same outcome information is readily accessible to all administrative entities, schools and consumers.

Putting It All Together Into A Single System. How does follow-up data and a knowledge of the external economic environment really drive an education and workforce development system? Outcomes data represents a closing of the planning and operations circle. Schools can combine their understanding of the external economic environment with a knowledge of the labor market experiences of graduating students to modify program offerings and adjust curriculum to become more responsive to labor market trends. Consumers are exposed to information about the external labor market through labor market publications and automated career information systems such as SOICC's Texas CARES and RESCUE systems. They can combine this knowledge with school and program outcome information to decide which offers the most effective paths to their career goals.

This notion of informed choice says that it is a student's responsibility to select a career path, but each student should be able to do so based on reliable information about regional labor market trends and performance data about previous student cohorts completing any given program or school. The system does not dictate to the consumer what career path they must take; instead, the student is provided information and counseled how to use it to make their own career development decisions.

Finally, the state and local agencies responsible for monitoring program performance should have access to the same program outcome data to ensure program accountability and work toward a positive return on the investment of education and workforce development funds. Toward this end, Local Workforce Development Boards, the Texas Workforce Commission, and the Texas public education system can play a major role both in supporting the creation and dissemination of information about the external economic environment and ensuring access by all parties to comprehensive follow-up data. This allows local service providers to make sound planning decisions within the local context while ensuring that the funding and oversight bodies have sufficient outcome accountability to the legislature and taxpayers of Texas.

This system vision is coming closer to reality everyday. There is an increased emphasis by the public education system on assuring that occupational training program offerings are related to labor market demand conditions. The Texas Quality Workforce Planning (QWFP) initiative made major strides in linking public education to targeted industries and occupations in each region. The Tech Prep initiative has begun to link multiple levels of education into coherent sequences of course offerings that build the skill base of participating students without duplication and lost credit hours.

And finally, the Texas SOICC, through career and labor market information software and publications, automated follow-up and the new Consumer Reports System, has helped make quality information more readily available to all stakeholders. Together, Texas is well on our way to creating a truly integrated, market-driven education and workforce development system.

AN ANALYSIS OF TECH PREP STRATEGIC PLANNING

by
Oliver D. Hensley, Ronald Opp, Pamela Ann Cooper,
Bethany Rivers, and Gloria Stewart
SPECAP
College of Education
Texas Tech University
Box 41071
Lubbock, TX 79409-1071
(806) 742-2329

In a previous article, the Tech Prep directors were identified as the architects of the future of Texas. The blueprints for the future of Texas education and economic growth were the Tech Prep proposals written by the Tech Prep directors. From the SPECAP (Strategic Planning, Evaluation of Curriculum, and Assessment of Performance) studies of Tech Prep programs in Texas, we conclude that the most powerful tool for effecting change in the educational enterprise is strategic planning. The Tech Prep proposals, drafted in the early part of 1991, have served as strategic plans for developing and installing viable Tech Prep programs in hundreds of schools. The addition of the Tech Prep option to the traditional college prep option is a remarkable advancement in the public school program that has been resisted for decades. Moreover, the Tech Prep consortium proposals outlined a scheme for naturally articulating high school programs with college programs. This was an unthinkable concept prior to the emergence of Tech Prep consortia with their strategic planning for education and economic development in their region.

After a preliminary study of a number of Tech Prep programs in Texas, the SPECAP principal investigators felt that the Tech Prep consortia were introducing significant changes. Their initial observations lead them to the conclusion that the Tech Prep directors were playing the key role of architects of change and the Tech Prep consortia plans were essential elements in bringing about that change. Consequently, they proposed to analyze the strategic planning system for Tech Prep in Texas to determine its particular sites of efficacy and its exemplary processes.

Because strategic planning is such a complicated and continuing process, a planning model such as that shown in Figure 1, allows everyone involved in development activities to share a common frame of reference for their planning activities and permits the planners to check progress toward the development of a series of previously agreed upon outcomes. The SPECAP project is built on the assumption that the organizational structure and the processes of effective Tech Prep programs can be modeled, characterized, evaluated for effectiveness, and then sealed by feeding the curriculum evaluation and performance assessment information into the strategic planning process. The model guiding this research project can be found in Figure (1).

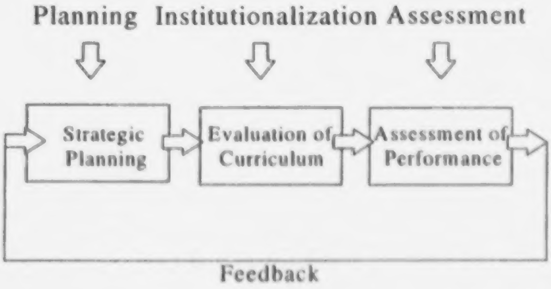


Figure (1) SPECAP Model for Effective Planning and Practice

The SPECAP model is new and relies heavily on expert systems techniques for modeling the Tech Prep system. Stakeholders, as the experts in the system, validate the structure and major processes of the systems as described by the SPECAP Model.

The SPECAP Model suggests that Tech Prep consortia begin their work by planning the means, objectives, goals, and strategies to follow in organizing and prioritizing the implementation of Tech Prep. Following the adoption of a planning process for the consortium, the curricula for Tech Prep programs are created or revised to fit Tech Prep concepts of effective technical and vocational programs. The fitting of Tech Prep curricula and courses into schools is the institutionalization of the SPECAP Model. These program curricula are then evaluated by school- and work-based experts to determine their validity and effectiveness. This is the assessment phase of the SPECAP Model.

The consortium uses the planning, institutionalization, and assessment information to implement changes in the consortium and program planning to improve the effectiveness of the total program. In a similar fashion, the performance of students, faculty, and consortium staff are assessed at appropriate intervals to determine the strengths and weaknesses of these key groups involved in Tech Prep. Based on this performance-assessment information, changes are implemented in consortium and program planning to improve the performance of these groups.

In 1994-95, the SPECAP group developed comprehensive analyses to determine the impact of Tech Prep planning and implementation on both education and economic development within the state of Texas. Figure (2), A Model of the Tech Prep Strategic Planning Process, shows the elements of Tech Prep the SPECAP group identified that would answer the overriding question of whether or not Tech Prep was providing a competent and technically-educated workforce for Texas industry.

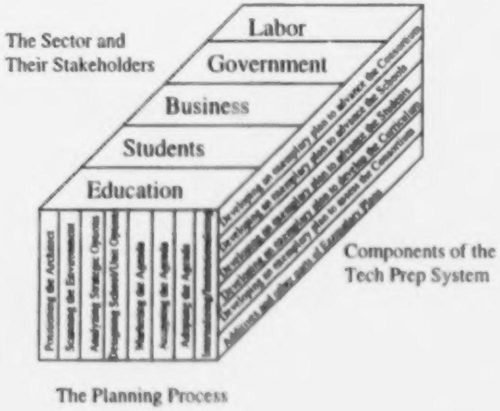


Figure (2). A Model of the Tech Prep Strategic Planning Process

In the first stage of the SPECAP 1994-95 comprehensive analyses, a review of the Carl Perkins 1992-93 Tech Prep Implementation Proposals from the 25 consortia determined the extent of the consortium's planning for the development of a regional Tech Prep consortium, evaluation and enhancement of the local schools' Tech Prep curricula, and assessment of performance. Identified exemplary planning processes and system components can serve as demonstration sites for superlative Tech Prep programs.

The SPECAP group developed consortia questionnaires to obtain empirical data about policies and practices presently used by Tech Prep consortia in each of the three areas of interest: strategic planning, curriculum evaluation, and performance assessment. People representing each of the key stakeholder groups involved in Tech Prep: secondary faculty, counselors, and administrators; postsecondary faculty, counselors, and administrators; business and industry; and labor and government representatives received consortia questionnaires.

In conjunction with the distribution of these questionnaires, each Tech Prep director was asked to identify the most effective consortia, again in each of the three areas of study: strategic planning, curriculum evaluation, and performance assessment. A total of nine consortia were identified as having exemplary activities in the following areas:

- Strategic Planning: Capital Area, Central Texas, and West Central Texas Consortia
- Curriculum Evaluation: Alamo, Concho Valley, and Panhandle Consortia
- Performance Assessment: Coastal Bend, Golden Crescent, and Upper Rio Grande Valley Consortia

Key stakeholders from these nine consortia were interviewed by telephone to obtain details on exactly how they implemented these exemplary policies, practices and procedures.

In analyzing the consortia's Tech Prep 1992-93 implementation proposals, SPECAP used the CUES checklist developed for this study. The CUES checklist established guidelines for evaluating planning with regard to eight, dynamic processes (see Figure (3)). Although results will be discussed in order, it should be noted, however, that this is a dynamic, interactive planning system and not a simple linear process.

I. Positioning the Architects. To determine the "architects", and therefore, the design of the structure, the consortium must start with some sort of planning structure and a long-term schedule to develop Tech Prep according to the consortium mission. Once established, this structure must be filled with competent and enthusiastic individuals who then become the key developers responsible for the general planning of the consortium. For this reason, individuals in Tech Prep were chosen for their knowledge, abilities, and personalities to be advocates, risk-takers, and visionaries to champion Tech Prep.

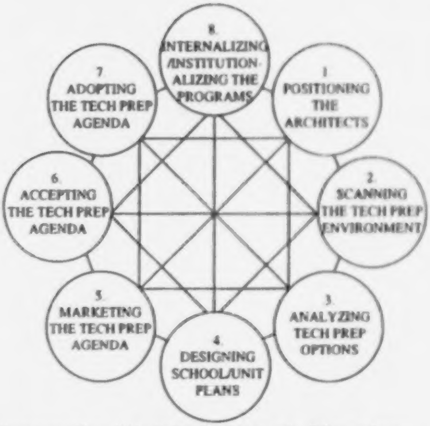


Figure (3) An Interactive Model of Strategic Planning

The SPECAP analyses determined that Tech Prep Consortia, as provided in their proposals, correctly positioned their "architects". Each consortium had the assurance of the long-term presence of partners totally committed to developing Tech Prep.

For most consortia, a primary institution supported early sponsorship and understood the role of sponsorship in planning and implementing Tech Prep articulated programs. Documents indicated plans for establishing Tech Prep Advisory Committees or Steering Committees composed of key stakeholders from government, school districts, colleges, labor, and business and industry to oversee the administration of the project. These Tech Prep Advisory Committees were, by definition, representative of the stakeholders of the region. For example, in the Concho Valley Tech Prep Consortium, the QWFPC representation provided significant early leadership in many program planning activities.

In reading the proposals, obvious liaison structures between partners, associates, and affiliates emerged. Key connections among individuals and existing groups, such as congressmen, state legislators, school board members, labor and governmental councils, coordinating boards, vocational advisory boards, and school associations were frequently mentioned.

Many consortia established groups, committees, and task forces on multiple levels, drawing membership from a diversity of entities and sectors. To ensure a balance, the planning team was designed to have representation from all levels. The Council of Governments (COGs), Job Training Partnership Act (JTPA), Private Industry Council (PICs), Quality

Workforce Planning Committees (QWFPC), Texas Employment Commission (TEC), American Association of Retired Persons (AARP), American Federation of Labor/Congress of Industrial Organizations (AFL/CIO), local chambers of commerce, major businesses and industries, the public independent school districts, Knowledge Evaluation Groups (KEGs), nearby two- and four-year colleges, as well as universities, provided representatives for committees like those at Capital Consortium.

The work of these planning teams was published in the form of policies and, more importantly, as outcome measures. Multiple processes, often in the form of training workshops, were designed to make the stakeholders, be they teachers, administrators, or board members, aware of their responsibilities for planning the Tech Prep prgram and developing specific occupational programs.

In addition to planning educational opportunities for students, there must be some assurance that the advisors can and do assist the students in developing student career strategic plans. In addition to students discussing their plans with their parents and teachers, the proposals often mentioned opportunities for prospective students and their parents to meet with previously successful students to evaluate for themselves the occupational benefits of Tech Prep. Also, many consortia gave employers opportunities for input in the curriculum and students' career plans.

Furthermore, development of the programs and courses were found in curriculum planning teams at the school level. These boards and teams were responsible for building a model for each of the occupational areas as well as setting policy for developing student 2+2 (or 2+2+2) career plans. These curricula designers were given the charge of integrating Tech Prep programs with established academic courses, and as Capital Tech Prep Consortium discussed, with current activities such as the Texas Council on Vocational Education public hearings, and the University of North Texas' discretionary grant on performance objectives. The paths developed by these architects would ultimately lead to degree or certificate programs. Moreover, these boards and teams were delegated the authority to construct a performance assessment model that could be used to evaluate the accomplishment of goals within each area and sector.

II. Scanning the Environment. The implementation proposals were analyzed for the thoroughness of their environmental scan to ascertain the needs and resources of the region. Generally, environmental scans commenced with a definition of the physical, political, and social characteristics of the region. Documents from the Lower Rio Grande Tech Prep Consortium provide an excellent example of defining geographic and political boundaries.

Using organizational charts and referring to the demographics of the region, the administrative structure of the consortium had to be defined and analyzed. Affiliate organizations helped support the mission of the consortium by providing needed facilities and services. These alliances epitomize the intent of Tech Prep to create strong partnerships among the sectors.

Viewing the consortium, its associates, and its affiliates as a single entity, an evaluation of the strengths, weaknesses, opportunities, and threats (SWOT) to the consortium is conducted. Once completed, the SWOT reveals opportunities for sharing work or articulation agreements. Results from the SWOT could also be used to build mutual development plans, to strengthen the consortium, meet school needs, and serve other needs of the community.

Serious thought went into this evaluation and some of the exemplary plans follow. Global Tech Prep Consortium demonstrated excellent initiative in obtaining computers for one of its programs as well as identifying threats that may impinge on the project. Southeast Texas Tech Prep Consortium, listing their existing programs, mentioned that one of their school districts already has arrangements with a nearby hospital for clinical rotations for high school students. The next step, to enhance this partnership to include Tech Prep, is obvious. Brazos Texas Tech Prep Consortium identified the current and future Employment Occupational Needs for the area using QWFPC Labor Market information and validating it through regional employers. Southeast Texas Consortium provided a comprehensive chart of Consortium goals and objectives, listing current experiences, barriers, purposes, and payoffs.

Many consortia looked at a wide variety of factors to ascertain specific information. The proposals for Gulf Coast and Central Tech Prep Consortia cited numerous publications. A scan of the history of the curriculum in the schools and partnerships with other organizations within the impact areas identified mutual areas of concern and philosophical orientations.

The Golden Crescent Consortium conducted in-depth research on the historical and philosophical aspects of their region as well as reviewing existing programs. The mission of the consortium and other regional organizations were analyzed to identify possible partners and competitors. The resources of all affiliates were identified, looking for opportunities to share development efforts, facilities, equipment, and courses. In their goals, Golden Crescent Consortium specifies how existing work programs and those businesses and industries already hiring high school students will articulate their efforts. Upper Rio Grande described the history of its articulation programs with El Paso Community College, the Regional Planning Cooperative, and their PIC.

There must be, as part of the strategic planning process, performance assessment techniques to determine the effectiveness of the consortium's policies and practices. Coastal Consortium, from an operational and tactical standpoint, was very strong in presenting an analysis of all of its strengths, weaknesses, and opportunities. Upper East Tech Prep Consortium specifically discussed problems with apathy, understaffing, and regional perceptions toward Tech Prep. The Lower Rio Grande Valley Tech Prep Consortium gave a thorough description of potential threats to their consortium, e.g., problems of image in the community, turf battles, reluctance to change, and negative attitudes of some teachers. The proposal went on to discuss weaknesses at the state level, such as differing standards of services for special populations, and lack of JTPA services for the seventh and eight grade. They concluded by providing suggestions to eliminate or ameliorate weaknesses.

III. Analyzing Strategic Options. In the master plan, there was usually a description of how the consortium was to secure listings of occupational and target school options in the region. For example, the Alamo Tech Prep Consortium developed the consortium master plan, letting a special needs task force developed the regional plan. Some consortia, such as Concho Valley, made unilateral decisions handing down information to the individual schools from there. Because employment statistics had indicated the potential for growth and earnings as well as ample job opportunities, Concho Valley purposefully designed a health program to be implemented in all seven of their Independent School Districts (ISDs).

Other consortia had a different approach. They would provide options and leave the details of implementation to the partners. The broad scope of options found in the consortia proposals was considerable, e.g., child development, nursing, criminal justice, food services, equine technology, cosmetology, bio-medical equipment technology, laser and electro-optics, nuclear technology, aviation technology, real estate, and financial specialties. Gulf Coast Tech Prep Consortium proposed an aquaculture/marine technology program, in addition to chemical, environmental, and instrumentation technology programs. These appear most appropriate considering the geographic location of the region.

How do they propose to accomplish these feats? Each consortium had a solution. In Brazos Valley Consortium's member ISDs, competency-based standards for all disciplines were adopted and students are required to pass an exit exam to earn credit. Also, Brazos Valley is initiating a Tech Prep awareness program that will encompass kindergarten through the ninth grade. The Middle Rio Grande Tech Prep Consortium's proposal mentioned bringing guest speakers into the classroom to introduce different career options to students from kindergarten through sixth grade. South Plains suggests that career exploration begin in the fourth grade. School decision-making packets for option analysis included samples of the decision elements, prospectus, and proposals required for Tech Prep program development as well as a discussion about sharing resources. The Panhandle Consortium even included a sample articulation agreement in their proposal.

To be successful, every partner must understand their role. There must be clearly stated expectations of the superintendents, principals, teachers, supervisors, and Tech Prep staff. Fiscal matters are equally important. There must be an assessment of financial support options to include those involving business and industry, schools, private foundations, state, and local organizations. As income revenue would be an on-going concern, Heart of Texas developed a standing committee to discuss ways of acquiring financial support and to look into opportunities for receiving funding from external sources; North Texas looked more immediately about receiving a New Beginnings Grant.

By nature, Tech Prep consortia must consider different instructional and service delivery modalities. Proposals indicated that the feasibility of alternative delivery strategies such as distance learning and on-the-job training, in addition to or in lieu of regular classroom instruction, were considered. Many consortia solved their delivery system dilemmas creatively. South Texas planned to solve some of the problems of an expansive rural community by establishing Instructional Support Satellite Centers in each school district. Gulf Coast wrote of establishing an interactive video broadcasting system within its consortium, using video disks to "standardize" instruction, and improving instructional methodology in the classroom of key scientific principles. Middle Rio Grande Consortium discussed providing tapes from teleconferences like STARLINK, or a telephone-based toll-free network link TENET, or perhaps even a computerized bulletin board.

These Tech Prep programs had multiple entry-multiple exit points that encouraged students to progress in a 2+2+2 Articulated Program. North Texas went so far as to describe plans on the magnitude of 1+1, 2+2, and 4+2+2 with all options in place. Concho Valley Consortium focused on the transition of students from school to the workplace. They developed Student Career Strategic Plans that included options for job shadowing, apprenticeships, plant tours, and mentorships. In order to offer a diversity of experiences, Gulf Coast incorporated field trips, internships, co-ops, mentorships, and summer jobs into their plans as well.

The multiplicity of options requires a system to monitor student progress in the Tech Prep Educational system. Through fortuitous circumstances (a ready, able, and willing programmer on staff), North Central Texas was able to create a custom-designed database to monitor student progress. Upper East has a similar program using the Instructional Development and Communication System (IDCS). In addition to curricula development and course organization, it also tracks and records students' progress.

School curriculum enhancement plans had to be considered in the context of changing resources and delivery modes. Because of the differing sizes of its ISDs, North Texas Consortium economically decided it would be better to create a joint school to share facilities and programs, and then worry only about busing and classroom schedules. Permian Basin considered concurrent enrollment, or "circuit" instructors. Models for new curriculum development include techniques such as SPANS, SOCRATES, TIINS, FANTUS, and disciplinary registers. Gulf Coast mentioned keeping its curriculum updated to match the Governor's Employability Standards, as they are established. The Lower Rio Grande used the Texas Assessment for Supervision and Curriculum Development's "Project ABCD" for computer-managed electronic mathematics curriculum for pre-kindergarten through twelfth grade.

In addition, the development of Tech Prep classes and programs had to be considered in the context of realistic budgeting both today and in the future. Good proposals considered all types of strategic views for budgeting. Alamo Consortium was to ask JTPA for funding for workplace learning; Heart of Texas listed a goal to be self-sufficient after five years; and Global made a flat statement that schools and businesses would assume all funding after the initiation of the program.

However, budgeting was not the only challenge. Each proposal had to address a large number of options. Many consortia tried programs like Heart of Texas Consortium when, in addition to the high school level, they developed a bridge program for adult learners, complete with a support system to understand problems specifically related to adult learning, and to identify when intervention was and was not appropriate. South Plains planned to implement an Adult Tech Prep program at the community college level so adults could return to school from multiple entry points. The costs and long-term outcomes for the various Tech Prep classes had to be considered in conjunction with the cost of regular classes, and compared to the consequences of not performing Tech Prep.

Designing School/Unit Plans. The consortium Tech Prep proposal had to be directly relevant to the Tech Prep purpose and yet still give the schools and other members of the consortium options. Some consortia had a policy for each target school to develop its own plan within the context of the general school systems program integrating various options for Tech Prep program development and maintenance, which was then reviewed and prioritized according to an overall consortium policy. The Lower Rio Grande spent energy developing course matchbooks for the college and university levels, ending with inverted degree plans for those schools. Each consortium established specific goals to be achieved and a time frame to complete those goals, making funding commitments for the next period based on the best estimates of funding available. After that, they considered additional funding and resources to further develop Tech Prep. More than one group, Central included, divided their stakeholders into task forces in specific areas to more clearly define these goals, including marketing, professional development, curriculum enhancement, resource development, and student services. Once these task forces were set up, the areas of responsibility became more focused, and as it is obvious in the proposals, the goals became much more specific and achievable.

Considering the faculty prospectus for course development, each target school was to develop its own strategic plan based on a number of options. Professional workshops were held for faculty to show stakeholders how to develop a unit plan, as well as how to develop prototype and demonstration classrooms for Tech Prep. Deep East Texas Consortium held a staff training to implement a program needs assessment. In addition to Global Area Consortium's five week training workshop, and its in-house training, it established workplace-based faculty development for interdisciplinary teachers, so that competency-based curriculum could be designed more easily. Some consortia gave the teachers the opportunity for industry internships, and shadowing experiences. Ultimately, the school plan was to develop 2+2+2 Tech Prep Models for each specific occupation and articulation agreements for certificate and degree programs, similar to those designed by the Southern Region Transfer Articulation Group of the Lower Rio Grande Consortium. This group made active progress with Texas State Technical College, University of Texas at Brownsville, and University of Texas Pan American, as well as establishing articulation agreements with twenty-three high schools in the Lower Rio Grande Consortium service area. Upper Rio Grande even designated an articulation office to serve as a distribution center for materials.

Some coordination of the school-to-work transition had to occur in both the school strategic plan and the student strategic plans for career development. Gulf Coast Consortium contracted with Palacios Economic Development Foundation for career placement services, in addition to a "Career Success Seminar Series" for students and a summer Tech Prep Career Institute. Students had to design their student strategic plans for career development (and advancement), listing specific objectives, and a personal timing and funding commitment, with their parents' approval and supervision. In addition to academic and Tech Prep classes, these student strategic plans also included other activities such as career sampling, cooperative education internships, apprenticeships, and/or school-based work.

V. Advocacy and Marketing of Tech Prep. For this program to work, there must be some type of advocacy and marketing plan to advance the Tech Prep agenda among local constituencies. Before this can happen though, each stakeholder must attain a comprehensive understanding of Tech Prep. One of the most noteworthy attempts to achieve this was Gulf Coast's "Benchmark Tours", where the stakeholders were shown successful Tech Prep programs across both the state and nation. The Tech Prep director plays an important role in the marketing aspect by being a member of the Tech Prep Director's Association of Texas, Inc., and making an effort to meet with applicable Boards of Education to explain the Tech Prep program, and the local cost and benefits of their adopting such programs using local moneys. The director must also persuade local business leaders to offer a full range of career development opportunities on business premises, and cordially accept Tech Prep graduates. The Lower Rio Grande Consortium gave this responsibility to their local PICs, asking them to host seminars for business and industry to promote Tech Prep.

Internally, there must also be a comprehensive advocacy and marketing program for professional development among school personnel, and a plan to gain acceptance, perhaps using teachers as interns in Tech Prep positions in local businesses. The Heart of Texas Consortium categorized their professional development as six different activities:

- an increased understanding of the Tech Prep program;
- an appreciation of competency-based education;
- collaboration in curriculum modification;
- effective delivery of Tech Prep in the classroom;
- counseling and support activities; and
- leadership in educational administration.

The Tech Prep consortium director in Concho Valley also met with teachers at in-service training programs to explain the opportunities for teachers to develop and deliver curricula and other programs for Tech Prep. A summer institute training provided Golden Crescent Consortium teachers with technical assistance and training upgrades; resource guide books or interactive computer programs easily assisted other faculty.

When the Tech Prep framework has internal support, there must be an advocacy and marketing plan to increase students' and parents' awareness of the opportunities in Tech Prep programs in education, business, and government, through printed material, peer recruitment or, if possible, radio and television marketing programs.

For ultimate growth, however, there must be a plan for advocating and marketing the curriculum articulation agreements among all the stakeholders in the region. Included in this group are the public schools, community colleges, and four-year institutions that need to collaborate to develop curriculum registers that include articulated courses, and plans for advocating college acceptance of advanced placement courses. East Texas Consortium alone has already filed three hundred and fifty course articulation agreements. Gulf Coast Consortium already has these plans in place with Corpus Christi College, and the University of Houston, to do that.

VI. Accepting the Tech Prep Consortium Agenda. Mission statements, like Upper East and North Texas, provide a strong forward-thinking mission, with a general charge that allows the consortium to extend its efforts into unexplored areas, identifying Tech Prep education as a guide for the consortium to focus attention on common interests, with evidence of long-term commitment. They listed the numbers of their special populations including the economic and educationally disadvantaged, those lacking English proficiency skills, foster children, and school-age parents. Tech Prep is helping these people!

For quick acceptance, the philosophy statement must identify the major functions that the stakeholders perform, and suggest a way to develop these functions, addressing primary modes of inquiry and each member's responsibility. As Panhandle Consortium wrote in their implementation proposal:

> *"Nothing the magnitude of Tech Prep has ever brought together . . . [a lengthy listing of an amazing assortment of groups] . . . as has this Tech Prep program. . . . the goal of this consortium will consistently remain that of working together to provide a seamless relationship between secondary and post-secondary Tech Prep . . ."* (p.7).

Implementation proposals included agendas complete with goals, performance measures, and time requirements. Coastal gave one general goal, broken down into ten objectives to form a strong mission and philosophy statement, with some aim at strategic planning.

Once patterns were established, it was necessary to examine funding sources. Central Consortium was quite optimistic about its program eventually becoming self-sufficient. Global Consortium was pointedly frank. It stated in its implementation proposal that the Carl Perkins funds were to be primarily used to start new programs, and afterwards, the

164

budgeting would be assumed by the ISDs. Brazos Valley Consortium volunteer that most of Blinn College's current offerings have been established and maintained by local funding and significant employer contributions. Upper Rio Grande did more than discuss sharing resources and funding sources: they listed two pages of donations received in the past year. When the community begins to contribute in this way, it is no wonder that model programs are instituted.

VII. Adoption of the Agenda. So the consortia have built the foundation, and the programs are beginning. The questions remains as to how deep the planning went and how closely it matched the philosophy behind Tech Prep. Many saw the Tech Prep initiative as only a means of further funding their current vocational education programs, while others rightly saw the Tech Prep initiative as a method to bring long-term change in the educational sector.

Capital Consortium did an exceptional job showing strategies to implement Tech Prep in the schools and developing a plan to determine if the career awareness and follow-up activities were appropriate for their purpose. Panhandle Consortium planned to evaluate their students through a MAP system. One of Tech Prep's most common fears was theoretically solved in a positive, merely problematic statement, in writing from Heart of Texas' proposal: "Teachers will discover how not to sacrifice academic integrity in meeting the learning needs of Tech Prep students" (p. 17). The Deep East Consortium designed an evaluation plan chart, including monthly, quarterly, mid-year, and final reports that helped the stakeholders follow the development of programs in the local schools and cooperative institutions of higher education.

VIII. Internalizing and Institutionalization. Tech Prep programs have been doing more than making mere surface changes. According to the Upper Rio Grande Consortium, Tech Prep provides a model for cooperative efforts between the resources of the legal/correctional community and the resources of higher education in their community. Tech Prep helps address the problems of Law Enforcement (LEP) and English as a Second Language program (ESP) students entering the fields of law enforcement and correctional science and not always able to fully understand the English legal vocabulary and concepts needed for the Mexican/American border environment (p. 28).

When Tech Prep programs are placed in the schools, and final adjustments are made, the institutionalization begins. Gulf Coast Consortium discussed student placement seminars, to assist students preparing résumés, and other important job skills. Heart of Texas brought up an interesting concept: part of the current school battle is retaining students. Therefore, it makes sense to evaluate each failure to determine the reasons people dropout, such as family problems, difficulty with rigorous coursework or financial difficulties. Heart of Texas Consortium planned to have the local school counselor follow-up on identified problems. These are immediate and concrete examples of school institutionalization of Tech Prep initiatives.

Telephone Interviews. Supporting all of this, telephone interviews of exemplary Tech Prep programs' key stakeholders found that planning is viewed as vital to develop a successful Tech Prep program. One interview participant noted that when the Tech Prep program was started, people were unaware of it and getting it off the ground and in people's minds is critical. Respondents indicated that a consortium that doesn't plan doesn't get off the ground. An interview participant from the government sector strongly emphasized the need for planning: "planning is more important than the actual implementation."

Interview participants gave several illustrations of successful Tech Prep planning: additional funding to the region; human and financial support; and the development of vertical teams (K-12) in disciplines such as math. An interview participant from a postsecondary institution noted that there are many indicators including the number of students and school districts involved, the number of pathways available, the level of attendance and participation in consortium meetings, and the number of articulated programs.

Suggestions to improve Tech Prep's planning process included a coordinated state-wide system to track students (preferably electronically), the development of technological communications within each consortium, and the expanded participation of sectors in meetings.

Several aspects of Tech Prep planning were viewed as exemplary, particularly the involvement of all stakeholders, especially representatives from business and industry, and the creation within the school districts of a better understanding of the business perspective. One interview participant discussed a yearly retreat held to physically bring everyone together to provide input in the reapplication process. Toward the end of the year, in a recap of activities and achievements, everyone is involved in the process of evaluation and planning.

Tech Prep planning is credited as having improved students' preparation for the workforce in several different ways. The knowledge of marketable careers and the realization of the connection between school and job requirements are key components. Employers have expressed a preference for Tech Prep students because, through a coherent sequence of courses, they are more motivated and focused on where they going in life.

This planning has also positively affected the relationships between educational sectors. What was previously a non-existent or limited sharing of information between secondary and postsecondary institutions in the past has developed into a more professional and cooperative relationship. An interview participant from a postsecondary institution said,

> *"For years the word 'articulation' was heard but it usually meant that a sole individual would make contact with a single employer or a single course, and now it is a total effort."*

The same is true of the relationships that have developed between the education sector and the business, industry, labor and government sectors as a result of Tech Prep planning. One interview participant pointed out the natural increase of respect among sectors. Another participant from a postsecondary institution noted that a greater contribution made in curriculum and curriculum development by industry. Overall, additional on-the-job training and other programs that have developed as a result of Tech Prep planning have resulted in many closer relationships.

Almost all of the interview participants agreed that most of the partnerships that have developed between sectors are a result of the facilitation provided by the Tech Prep consortia. One interview participant acknowledged that what were previously fragmented approaches have become more organized through the Tech Prep Consortia. "We're an umbrella; everybody gets to benefit." Another interview participant noted that because representatives from different sectors participate in Tech Prep meetings, contacts develop that were previously non-existent.

> *"Businesses didn't realize what we (education sectors) are doing. Now, being in Tech Prep, they can look at their needs and see what we have to offer them."*

An interview participant from government said,

> *"The quickest and easiest way for employers to buy into the system is through the planning process . . . Our Tech Prep is the most forward thinking group in which I've ever had the privilege to participate."*

We have found that strategic planning is the most powerful Tech Prep tool for effecting change. The Tech Prep consortia were the organizations that implemented a series of new educational options in 25 regions of Texas -- strategic planning was their major tool. The Tech Prep strategic planning process involves a wide range of stakeholders who are highly aware of local conditions, knowledgeable about what is needed to advance technical education, and committed to institutionalizing a large number of interrelated innovations.

A SWOT ANALYSIS OF THE TEXAS APPROACH TO TECH PREP DEVELOPMENT

by
Ronald D. Opp
SPECAP
College of Education
Texas Tech University
Box 41071
Lubbock, TX 79409-1071
(806) 742-2329

Texas has developed a statewide Tech Prep system through the creation of twenty-five Tech Prep consortia. One way to examine the effectiveness of Texas' approach to Tech Prep development is to analyze the strengths, weaknesses, opportunities, and threats of this approach using a SWOT analysis common to the strategic planning process (Hensley, 1992). This article uses a SWOT analysis to examine the policies and practices that other state policy makers might consider in developing their own Tech Prep systems.

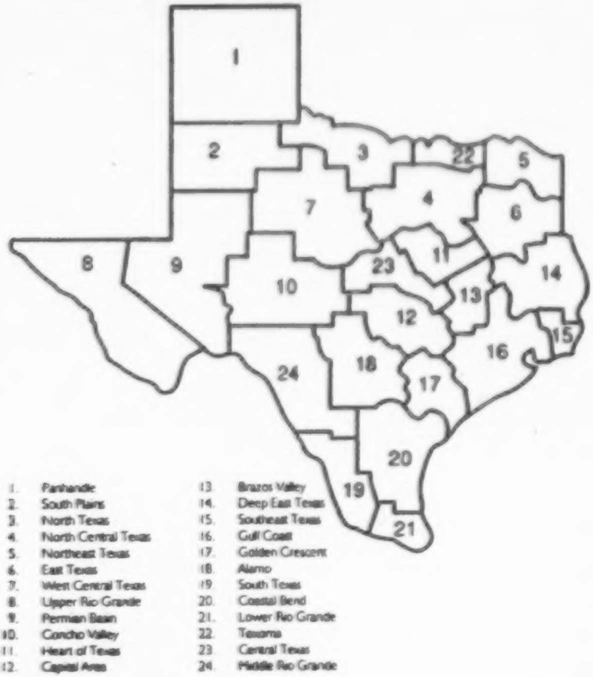
The Tech Prep Approach to Education Reform. Tech Prep has developed as a major force for educational reform throughout the country, typically designed as 4+2 (+2) programs: four years of high school education, two years of community college education, and in some career pathways, an additional two years of education at a four-year college leading to a bachelor's degree. Tech Prep programs are designed to provide a seamless transition for students between educational sectors, so that students can move smoothly from school to work. These programs are built on the premise that technical/vocational and academic subjects need to be integrated to better prepare American students for an increasingly competitive global economy. Tech Prep programs have also been designed with the labor market assumption that many of the jobs that will be created in the American economy in the coming decades will be ones requiring some postsecondary education, but at a level less than a baccalaureate degree. To better prepare students for this postsecondary education, Tech Prep programs are designed to develop in American high school students a strong foundation in both technical as well as academic subjects. Tech Prep advocates contend that many high school students who may not have otherwise considered attending college will be motivated to pursue postsecondary education in their Tech Prep career field. Because of their participation in Tech Prep career pathways in high school, these students will arrive at the two-year college with better developed academic and technical skills. Two-year college educators can then build upon these talents to prepare Tech Prep students for their chosen careers (Hull and Parnell, 1991).

Many Tech Prep programs in two-year colleges have also been designed so that students who complete an associate degree have the option to transfer to a four-year college to complete a baccalaureate degree. Articulation agreements have been designed in many states so that two-year college students with an associate of applied science degree have the option of obtaining a bachelor's degree with cooperating four-year institutions (Bragg and Phelps, 1991). Tech Prep programs have been created so that students have options not only in their choice of occupation, but also in the level of education they would like to pursue.

The Texas Approach to Tech Prep Development. Texas policy makers decided early on to use Tech Prep educational reform to develop a comprehensive statewide system, rather than implementing Tech Prep in a few pilot sites around the state. A tri-agency state partnership, consisting of the Texas Education Agency, the Texas Higher Education Coordinating Board, and the Texas Department of Commerce, was created to oversee the development of the Tech Prep system in Texas. Texas policy makers opted to make Tech Prep programs available to students statewide, funding a total of twenty-five consortia that encompass the state geographically. Within each consortium, partnerships were created between the local education sector, and the business and industry, labor, and government sectors. The boundaries for all but one of these consortia are coterminous with the boundaries of the Governor's 24 planning regions, shown in Figure (1), established throughout Texas to develop and report local labor market information and to develop regional plans to economically develop their service areas.

The Tech Prep consortia that have been developed in Texas span the state, with a mix of urban and rural consortia. Each consortium typically has a staff with, at minimum, a director and one or more clerical staff. Some of the larger consortia also have a staff member responsible for curriculum development. With one exception, community colleges serve as the fiscal agents for these consortia. The typical consortium brings together, in partnerships, representatives from a number of local ISDs, one or more two-year colleges, and one or more four-year colleges. Most consortia were set up with both an executive and a steering committee, along with other standing committees that focus on planning, curriculum development, evaluation, and public relations.

GOVERNOR'S 24 PLANNING REGIONS



Tech Prep consortia in Texas have been in existence for five years, and the number of institutions and students participating has grown dramatically during this time period. In the 1993-94, the first year for which data are available, there were a total of 11,398 secondary and 8,529 postsecondary students participating in Tech Prep programs. In the most recent preliminary figures for 1995-96, there were 56,821 secondary and 45,858 postsecondary students participating in Tech Prep programs. This is more than a five-fold increase in the number of students participating in Tech Prep programs over a three-year period (Brown, 1996).

The number of approved Tech Prep programs has also significantly increased over this time period. Today, there are a total of 378 distinct Tech Prep programs in 17 major occupational program areas statewide (Brown, 1996). The majority of students enrolled in Tech Prep programs are either enrolled in business management and administrative services, health professions and related science, or engineering-related technologies (Brown, 1996). Each regional consortium has been allowed to develop Tech Prep programs based on the occupations targeted for that region by its Quality Work Force Planning Committee, and on the programs and expertise already existing within its boundaries.

The Strengths of the Texas Approach to Tech Prep Development. There are a number of advantages to the way that Texas has developed Tech Prep programs throughout the state. One advantage is that all students in Texas have access to at least one Tech Prep program. Rather than funding one or two demonstration sites, state policy makers decided to fund a statewide system of 25 Tech Prep consortia. This was an ambitious approach, given the size of Texas and the incremental nature in which most state educational reform is undertaken.

An additional advantage of the Texas approach to developing Tech Prep programs was the decision to develop a tri-agency state partnership composed of the Texas Higher Education Coordinating Board, the Texas Education Agency, and the Texas Department of Commerce. To forge this type of linkage among state agencies through special legislation is a rather remarkable political feat in its own right, and a credit to the vision and cooperative spirit of legislators and policy makers in Austin. Fostering cooperation among these state agencies allowed individuals with expertise in workforce development within each agency to work together to develop a statewide system. This unique partnership has helped to ensure that the Tech Prep education reform effort has the united support of three state agencies rather than just one, which has undoubtedly helped buffer the Tech Prep approach to education reform from outside criticism. This united approach was certainly instrumental in staving off federal attempts to rescind financial support for Tech Prep for the 1996 fiscal year.

Another advantage of the Texas approach to Tech Prep development was the development of regional consortia around the state. Texas opted for a decentralized approach to Tech Prep program development, giving maximum latitude to the regional consortia to develop their own unique mix of Tech Prep programs that best met the economic development needs of their local service areas. This local control over curriculum development facilitated the involvement of local stakeholders -- representatives from business and industry, labor, and government agencies, as well as secondary and postsecondary representatives. These local stakeholders were empowered to choose which Tech Prep programs would be developed in their consortia, thereby fostering maximum cooperation and commitment. If Texas policy makers had opted for a more centralized approach to the development of Tech Prep programs, much of this essential local involvement of stakeholder groups would have been sacrificed.

Another advantage of the Texas approach is that each consortium was created to be independent from the institutions located within its boundaries. In particular, Tech Prep consortia were created to be entities independent from the community colleges or other governmental agencies that serve as their fiscal agents. The independence of the Tech Prep consortia has served as an important source of credibility for Tech Prep consortia staff attempting to solicit cooperation from educational institutions that often compete rather than cooperate with one another. The independence of the Tech Prep consortia makes it easier for educational institutions to view Tech Prep educational reform effort as representing equally their interests. The success of Tech Prep educational reform requires that educational institutions move beyond their own institutional self-interest to design a seamless system of regional workforce development.

The Weaknesses of the Texas Approach to Tech Prep Development. Although there are a number of advantages to the Texas approach to Tech Prep development, there are a number of disadvantages as well. Although the tri-agency state partnership that coordinates the Tech Prep educational reform effort in Texas was mentioned previously as an advantage of the Texas approach, it has the potential to be a disadvantage, particularly if state agency partners are not equally committed to and involved with the maintenance of the partnership. From the perspective of the stakeholder groups within regional consortia, it may take considerably more of their time and energy to work with representatives from three state agencies in attempting to gain program approval and to follow state regulations. Developing a partnership between state agencies requires conditions of close cooperation among staff and clear lines of communication. These conditions are often difficult to achieve because most state agencies suffer from high staff turnover and normal political battles over turf issues.

Another disadvantage of the Texas approach to Tech Prep educational reform results from the attempt to ensure the autonomy of Tech Prep consortia from administrative control of their fiscal agents. Although Tech Prep consortia have been designed to be autonomous, there have been a number of situations where Tech Prep directors have come into conflict with their fiscal agents over issues of autonomy. Administrators at two-year colleges argue that if they are to be held accountable for the fiscal decisions of Tech Prep consortia, then they should be given the authority to oversee the allocation of consortia's financial resources. Tech Prep consortia directors counter that state policy makers deliberately designed Tech Prep consortia to be autonomous units not under the direct control of community college administrators. There is an ongoing tension between some Tech

Prep directors and community college administrators, and the tension weakens the actual autonomy of some Tech Prep consortia.

The Opportunities for the Texas Approach to Tech Prep Development. There is a growing sentiment in Texas that the Tech Prep educational reform effort is a powerful vehicle for improving technical and vocational education. The Tech Prep approach to educational reform has captured the attention and commitment of individuals in a number of sectors in the state, including education, business, industry, labor, and government. Given the increasing emphasis within the state on workforce development, the Tech Prep approach to educational reform will undoubtedly continue to play a pivotal role in improving the transition of students from school to work.

Tech Prep consortia have a major opportunity to improve the linkages between schools and colleges within the educational sector. Researchers have long noted the relative paucity of communication between two-year colleges and other sectors of our K-16 system of education (Cohen and Brawer, 1989). Faculty from one level of our educational system rarely receive feedback from other levels about the relative preparation of their students. This lack of significant feedback across levels limits the ability of faculty to make meaningful changes in policies and practices that might improve the talent development of students within their institutions (Astin, 1991).

One of the greatest opportunities afforded by Tech Prep educational reform is its ability to generate purposeful feedback across levels about the talent development of Tech Prep students. Tech Prep programs provide an opportunity for faculty to communicate with each other in order to create a seamless transition between levels within our education system. Many of the faculty in different levels of our system may have had few, if any, previous opportunities to communicate with one another. The Tech Prep approach to educational reform promotes a view of education as a system, rather than just a linear arrangement of institutions. It forces faculty to think about the specific role they play in developing student talents, and to place the curriculum they teach in the larger context of a continuum of skills and essential knowledge elements covered within the larger system. The most significant opportunity that Tech Prep educational reform can offer is to promote within faculty and administrators a shift in their perspectives from narrow institutional concerns to a broader concern of student development across the educational system as a whole.

The Threats to the Texas Approach to Tech Prep Development. The most immediate threat to Tech Prep consortia in Texas is the attempt to cut off federal funding for Tech Prep programs. Although the attempts to rescind federal funding for Tech Prep for the 1996 fiscal year were defeated, the issue has raised questions in the minds of many around the state about the long-term viability of these consortia. The most fundamental question is whether Tech Prep consortia will continue in some form when federal funding is eliminated. One might expect that the stronger consortia would continue to receive support from their institutional partners, while the more marginal ones might very well be eliminated. Clearly, it is in the long-term best interests of every Tech Prep consortium to strategically plan for a future with little or no reliance on additional federal funding. Some Tech Prep consortia in Texas have received School-to-Work implementation grants which will allow them to broaden the scope of the work-based learning activities available to their students. Consortia need to take steps now to ensure their survival and institutionalization for the day when federal funding is decreased or eliminated.

A more persistent threat to the future of Tech Prep consortia are the strong centrifugal forces of institutional parochialism and competition between levels of our educational system. In times of downsizing and retrenchment, a common response among educators is an attempt to increase their institution's share of scarce resources at the expense of other institutions. In the Texas context, as state agencies downsize, there may be increased competition between the tri-agency partnership for control of the resources devoted to Tech Prep and other School-to-Work programs. This competition between state agencies for these scarce resources has the potential to hamper the cooperation and communication necessary to effectively manage these programs.

At the consortium level, Tech Prep is dependent on the ability of individual institutions -- high schools, community colleges, and four-year colleges -- to cooperate with one another in the best interests of students preparing for a career. If there is a perception that the benefits of participation in Tech Prep fall disproportionately on one level of our educational system, there may be a growing unwillingness for the other levels to participate in Tech Prep. Competition for students is particularly a source of tension between community colleges and four-year colleges. If four-year college faculty and administrators see that Tech Prep programs at the two-year college level decrease the enrollment of students in their own technical programs, they may be reluctant to support of the Tech Prep concept. The motivation of institutions in higher education to compete with one another is deeply engrained in our system of higher education, and may make hammering out articulation agreements between two- and four-year college Tech Prep programs particularly challenging.

Conclusions about the Texas Approach to Tech Prep Development. The Texas approach to Tech Prep development has much to offer other state policy makers interested in developing their states' Tech Prep systems. The Texas approach has succeeded in promoting three elements essential to any successful education reform: equity, excellence, and efficiency. Equity has been promoted by ensuring that Texas students have access to at least some Tech Prep programs in virtually every county in the state. The state should be commended for its efforts to ensure that Tech Prep programs are available to virtually all secondary and postsecondary students.

Excellence has been promoted by allowing regional consortia to develop their own unique mix of Tech Prep programs, maximizing the involvement of stakeholders at the local level. This decentralized approach ensures that the programs offered are relevant to the needs of the local economy, and that local experts are involved in the development and assessment of each program. To further promote excellence, formal mechanisms need to be developed so that consortia members can share their exemplary policies and practices with practitioners across the state. Sharing information about exemplary policies and practices can help foster a spirit of cooperation among the various consortia and can help maximize the talent development of Tech Prep students throughout the state.

Efficiency has been promoted by Tech Prep consortia by pooling the expertise and resources of local experts in developing Tech Prep programs. Having local experts in business and industry, governmental agencies, and labor donate their expertise to develop Tech Prep programs has reaped tremendous benefits for the state. Many business and industries have donated personnel and equipment, as well as time and energy, in partnerships with secondary and postsecondary institutions to develop Tech Prep programs. These donations of time, money, and energy have resulted in high quality programs, at a minimal cost to the state and to taxpayers, benefiting all stakeholders involved. Further efficiencies can be achieved as Tech Prep consortia work out articulation agreements with each other allowing students regional and statewide access to Tech Prep programs. Clearly, Tech Prep consortia provide a good example of the benefits that local areas and the state reap when educational institutions cooperate with business, industry, labor, and government in promoting the talent development of students.

References

Astin, A.W. 1985. *Achieving Educational Excellence*. San Francisco: Jossey-Bass.

Astin, A.W. 1991. *Assessment for Excellence*. New York: MacMillian Publishing Company.

Bragg, D.D. and Phelps, L.A. 1991. "Tech Prep: A Definition and Discussion of the Issues." *Wisconsin Vocational Educator*, Vol. 15, No. 2. pp. 4-7.

Brown, C.H. 1996. *Tech Prep ☆ Texas: Education That Works*. Beaumont: Region V Education Service Center.

Cohen, A.M. and Brawer, F.B. 1989. *The American Community College*. San Francisco: Jossey-Bass.

Hensley, O.D., ed. 1992. *Strategic Planning for University Research*. Lubbock: Texas Tech UP.

Hull, D. and Parnell, D. 1991. *Tech Prep Associate Degree*. Waco: Center for Occupational Research and Development.

TECH PREP -- THE ENGLISH TRANSLATION

by
Lynda Sutliff
5815 Pecan Valley Lane
San Angelo, TX 76904
(915) 651-7306

Jumping from the train at the Underground Station in London, I am propelled by the masses of people as I hurry down Kensington High Street for my appointment at the Royal Borough of Kensington and Chelsea Careers, Training, and Employment Service. I am keenly aware of how far Tech Prep education has taken me. After teaching health occupations for two years, I realized the need to update my skills and education so that I could present my students the latest in health technology. My current nursing graduate school curriculum brought me from San Angelo, Texas, to London, England, to study and research trends in vocational education.

As part of graduate study to explore cultural diversity in London, members of the master's nursing program at Abilene Intercollegiate School of Nursing participate in various exchange programs to investigate personal areas of interest in health care fields. My focus was on the British vocational education system, especially health occupations education.

My appointment with the counselors at the Careers Service Center is the climax of three months of telephone interviews with British education administrators and a review of their education system. Equipped with information on vocational education in the United States compiled by my career and technology director, Royce Burrows, and Tech Prep Consortium Director D'Arcy Poulson, I look forward to a lively international exchange of information.

The Careers Service Center counselors whom I personally interviewed had never heard of Tech Prep, nor had any of the English education administrators that I spoke with over the phone.

A preliminary study of the current English vocational system showed that, as in the US, changes in British education have been driven by rapid technological advances and intense international competition. The global imperative to establish cooperation between education and business is designed with the intent to ensure trained workforces that are closely matched with their respective nation's economy.

Toward this end, Tech Prep has been developed in the US, and its counterpart, the Technical and Vocation Education Initiative (TVEI) is emerging in Great Britain. While both education initiatives assert that, in the past, too much emphasis was placed on traditional academic achievement at the expense of vocational and technological knowledge and skills, Great Britain's system differs significantly from that of the US in its perspective and implementation of vocational education programs.

The main qualification for high school students in England is the General Certificate of Secondary Education (GCSE). This exam is taken by 16-year-olds after 11 years of general education. Students who pass the exam continue an academic route of education -- the advanced, or A level -- for two more years. This is the standard for entrance to higher education and many forms of professional training.

The alternative education route for students who fail to pass the academic exam is vocational education. Courses are offered in business, health and social care, hospitality and catering, leisure and tourism, and manufacturing and science. TVEI is the largest curriculum development project funded and administered by the central government of Great Britain. In 1993-1994, 80,000 British students were registered in TVEI and received vocational training and preparation for specific areas of employment.

My purpose for arranging interviews with counselors from the Careers Service Center (CSC) was to obtain impartial information about the worlds of education and work in Great Britain. The CSC is a private and independent counseling source that provides objective career guidance to all students between the ages of 16 and 21. Britain uses this independent sector as the liaison between education and business to meet labor demands.

Counselors provided insight into British vocational education and eagerly received information about Tech Prep. A powerful component of British education is the mandate that academic and vocational students alike are required to have at least two weeks of suitable work experience, following their eleventh year of school, before beginning their respective education tracks. This allows students the opportunity to gain business experience and emphasizes the practical application of knowledge. While bringing greater relevance to student education, work experience also allows employers to be involved in curriculum development.

The British version of Tech Prep shares the US focus on forming business and education partnerships with special emphasis on offering placements for teachers in business. This enhances teachers' awareness of careers and also extends professional and personal development.

I was told that all English students aspire to the A level, or academic route of education, but that some are just not suited for it. These students turn to vocational education. Although the British government claims to promote equal status for academic and vocational qualifications, I was struck by the dichotomy in the English system. Many students enter these programs as a way to remain in school until they reach 18 with no intention of following the prescribed career track. The British seem to recognize different learning styles of students and the relevance of both academics and technical ability as integral parts of education. Nevertheless, I definitely sensed that English vocational education has a second-class ranking.

Although there are scholastic components to the British vocational system, universities rarely recognize vocational courses. I asked specifically about the articulation of their health occupations credits to universities and was informed that only three universities in England recognize such credit. In addition, credit is given only to those students who study pharmacy and only if they also had taken the A-level courses in chemistry.

Whereas Tech Prep promotes a seamless transition so that students can move alternately between school-to-work, school-to-school and work-to-school, the British system compels students to decide early in their education the career route they will follow and limits their mobility in education. CSC counselors were intrigued by the Tech Prep plan for students to earn university and community college credit while in high school and acknowledged the benefits of encouraging continuing education.

Despite failure to provide universal academic credit for vocational education courses, Great Britain's initiatives to motivate the youth of their nation to strive for excellence in the workplace is noteworthy. Young employees are encouraged to work towards standards of competency set by industry, ensuring that jobs are done effectively. The National Council of Vocational Qualifications (NCVQ) develops a framework of standards and qualifications in all occupational areas. Employers and employee representatives set individual occupational standards and determine levels of competency. "Awarding bodies" in the United Kingdom develop assessments and award certificates for hundreds of "national vocational qualifications." By recognizing achievement, the aim is to improve staff motivation and morale in Great Britain.

I gained significant insight into the different ways our countries view careers through investigation of the English health occupations curriculum. Their health and social care program is one of the least popular vocational programs among students. The CSC counselors explained that careers in health care have very little status in England and subsequently do not pay well. This being in direct conflict with US attitudes toward health care careers, I wonder what effect the English system of socialized medicine has had on their perception of health care professionals. Can we expect to see a reversal in the status of health care careers in our country as the US moves toward a system of managed health care?

The most compelling message I discovered through my research is boldly stated in three objectives the English government lists for their recent reforms in vocational education:

- to build robust, dynamic local economies,
- to develop and encourage a world class workforce with the skills needed for successful business,
- to develop competitive businesses capable of taking on and *beating* global competitors.

My students are the *global* competitors that Britain intends to *beat*. This realization is both an admonition and a challenge. I had limited the scope of Tech Prep to my classroom in San Angelo, Texas, but Tech Prep is so much bigger than that. I have come to appreciate Tech Prep as a sound framework upon which the United States is equipping a generation of youth to compete in this global job market.

I have learned that students of all nations will be winners if they are given opportunities to develop both academically and through the acquisition of technical skills. Regardless of the translation, integrated programs like Tech Prep provide education that works. My challenge as a teacher is to recognize the inherent potential of each student and to effectively channel each individual talent toward meaningful careers.

THE SUMMER JOBS FOR YOUTH PROGRAM:
An Investment In The Future Well Worth The Price

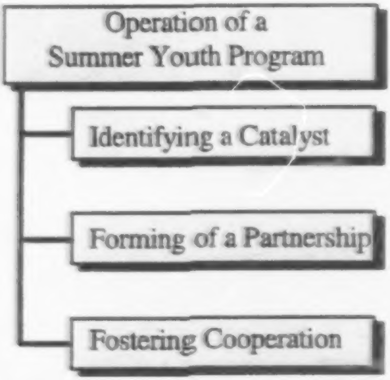
by

Denise M. Bloomquist
District Manager
Office of Representative Robert Junell
Texas House of Representatives
P.O. Box 3362
San Angelo, TX 76902
(915) 657-0197

and

Cynthia Lackey
Education Coordinator
Concho Valley School to Careers/Tech Prep
3197 Executive Drive
San Angelo, TX 76904
(915) 947-9552

Over the past several years, the trend to reduce federal and state assistance for summer youth employment programs has increased the need for private businesses to take on more responsibility for providing work-based learning opportunities for young people. One successful example of business response to this need is the Summer Jobs For Youth program established in San Angelo, Tom Green County, Texas, in 1995. With only five weeks of preparation, 116 business participants created 406 summer jobs, each for a minimum of 20 hours per week, for area youth ages 14 to 21. Each position lasted for at least six weeks, and pay scales ranged from $4.25 to $10.00 per hour. Over 850 young people, living within a 50-mile radius of Tom Green County, applied to the program in its first year. Half of the applicants were younger than 16 years of age. Application to the program was open without restrictions, except that applicants were required to be students enrolled in secondary or postsecondary institutions and within the specified age range. The program's success can be attributed to its simple three-stage plan of organization -- 1) Identifying a Catalyst, 2) Forming Partnerships, and 3) Fostering Cooperation, and its four-stage plan of operation -- 1) Orientation, 2) Organization, 3) Location, and 4) Evaluation. It is also a plan that can be easily replicated in other settings. Summer Jobs for Youth is an excellent complement to the regular nine-month Tech Prep education program that introduces youth to the world-of-work.



The three-stage plan for organization of a summer employment program began with Stage 1, Identifying A Catalyst -- identifying someone who could easily motivate others to participate in the Summer Jobs For Youth program. The catalyst was San Angelo resident State Representative Robert Junell, a four-term member of the Texas House of Representatives and Chairman of the House Appropriations Committee. His vision was to create a program which would employ young people in part-time summer jobs -- jobs that would be created and funded without government subsidies. Junell believed the program could be created within the remaining five weeks prior to the beginning of summer vacations for local secondary schools and colleges. He also recognized that this type of program would not be successful without the firm support of local educational units, business groups and employment officials. Consequently, he sought to enlist their support.

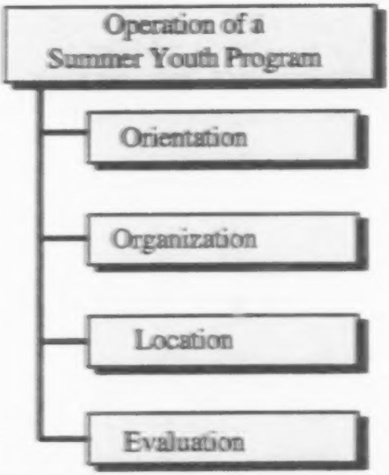
The enlistment of support from other agencies and groups moved the plan into Stage 2, Formation Of Partnerships. Within the next week, Junell recruited five additional partners -- Texas Employment Commission (TEC), San Angelo Independent School District (SAISD), San Angelo Chamber of Commerce, Concho Valley Tech Prep Consortium, and members of the local media -- to assist with promotion and operation of the program. All were eager and willing to participate, due to their high levels of respect for Junell's work in the community and the legislature, and because of his past support of, and participation in, their own projects and programming efforts throughout the area.

Once partners were recruited to assist with the program, Stage 3, Fostering Cooperation, began. It was recognized from the outset that cooperative efforts between all partners, and in all aspects of the program, would be required to ensure the program's success. Collectively, partners agreed to set a goal of creating 300 jobs for the program's first year. They also agreed that there was a need to solicit information from businesses and students which could then match students, as closely as possible, with positions that reflected individual student career interests and curriculum studies. In addition, it was decided that at the conclusion of the program, participating employers would be surveyed to determine levels of satisfaction and areas requiring improvement. Finally, each partner made an individual commitment to specific responsibilities of program operation. These commitments were directly related to each partner's current field of work, and combined, would assure that the program met its overall goal.

Individual commitments made by each partner were varied, but together they produced the full cooperation required to move the program forward. TEC and SAISD became the lead sponsors by signing an intergovernmental Memorandum of Understanding (MOU) (provided under the JTPA Act) to jointly operate the program. As the Texas Employment Commission cannot under normal circumstances restrict any applicant from available positions, and because this program would be age restrictive (only ages 14 to 21), this MOU was required. Execution of the MOU permitted the TEC to commit employee hours to the student application and placement process. The MOU also committed the SAISD to promoting and publicizing the program to approximately 2800 eligible students throughout its district. (Note: For areas choosing other methods or agents to provide job placement services, no MOU is required.)

At the same time, the San Angelo Chamber of Commerce made commitments to publicize the program through its events and mailings, and to provide business recruitment services. It also sought and received a grant of $3,600 from the Concho Valley Tech Prep Consortium to contract with three educational consultants. These consultants would evaluate all aspects of the program's operation, make recommendations for program improvements in future years, and make recommendations for integration of the program into public school and postsecondary curricula, as well as into local School-to-Work/Tech Prep Consortium efforts. Local media representatives pledged production time, air time, and print space for public service advertisements and articles promoting the program. Junell committed staff time and financial resources to produce all required printed materials for business and student recruitment, and to publicize the program at local postsecondary institutions and school districts throughout the area.

Over the remaining three weeks, these cooperative commitments produced the following results: 1,300 local Chamber members received requests to provide at least one position (20 hours per week, for at least six weeks, at minimum wage) for the program; a local radio station recorded public service announcements asking for business participation, which were distributed to the five primary radio markets; chamber officials made a direct appeal to their membership through their own newsletter and provided time at their monthly luncheon to promote the program; service organizations such as Rotary, Kiwanis, and Lions Clubs, made recruitment promotions at weekly meetings; press releases to the newspaper and four local news/information television programs publicized the program; applications for consultants were taken and three contracts were executed; the Chamber of Commerce, TBC, Concho Valley Tech Prep Consortium, and Rep. Junell's office staffs made personal recruitment phone calls to prospective employers; and 3,500 student applications and 100 posters were printed and distributed to area school districts and the two local institutions of higher learning. By the end of the three weeks, coinciding with the end of the secondary school year, the Summer Jobs For Youth program had surpassed its goal, securing commitments from 116 employers to provide 406 employment positions for students interested in obtaining a summer job.



Concurrently, during the three week business recruitment period, the task of matching student applicants with available businesses began. This process involved four steps -- Orientation, Organization, Location, and Evaluation. The orientation step provided assistance and advice to students on applying for, interviewing for, and keeping a job. The organization step involved dividing the students and available jobs into age groups. In the location step, efforts were made to appropriately place students. Finally, during the evaluation step, the consultants contacted participating businesses to obtain suggestions for future program improvements, and to ask for suggestions for career education integration into curriculum for grades K-12. Successful completion of each of these steps is necessary to ensure the future of the job program.

To complete the first step, Orientation, the partners in the Summer Jobs For Youth program developed a 45-minute workshop that covered topics related to the world of work and traveled to each junior high and high school in the San Angelo ISD to present the workshop. An additional workshop was conducted at Angelo State University for all postsecondary students unable to attend the session scheduled at their own schools, and students from other school districts who were interested in the program. At each workshop, students picked up suggestions on how to complete a job application, interview for a job, and behave on the job.

The second step, Organization, consisted of dividing job orders into categories by age. Once completed, the categories were sorted again by job type and required skills. The 856 student applications were similarly divided, first by age and then by interests and skills. This arrangement eased the matching of student interests and skills with employers' needs and expectations.

Once the organizational tasks had been completed, the most difficult job, placing students, began. This third step, Location, was the most time-consuming. Each job order required careful evaluation to determine all job requirements, the application procedure, and interview schedules required by the employer. Obtaining accurate information required at least one additional contact with each employer. Once all of the job-related information was completed, student applications were reviewed to match the best applicants with each position. After this screening process, students were individually contacted and asked to either complete an application for a specific business, or to commit to a scheduled interview with a specific business. This process was ongoing until all job placements were made (approximately three weeks).

The final step, Evaluation, was crucial to the success of future summer job programs. During this step, the consultants interviewed each participating business, via telephone, to receive opinions about the performance of the students employed, and to obtain suggestions for overall program improvement. In addition, Rep. Junell's office distributed a printed survey and evaluated the results. Once all of the information had been gathered, the consultants provided the program with a written evaluation detailing the strengths and weaknesses of the program. They also made suggestions for integration of career education into curriculum for all ages.

Ultimately, 406 young people between the ages of 14 and 21 went to work in the summer of 1995. All of these jobs were provided and funded by private businesses, organizations and agencies, and 93 percent of these employers responded that they were willing to participate again in 1996. The large number of applicants (856) testified to the community that area young people were willing and anxious to work. These levels of participation and positive feedback have resulted in efforts to expand the program within Tom Green County and to other communities in future years. The placement of over 400 young people in summer jobs is the result of strategic planning and the cooperative climate developed by business, education, labor, and government leaders, as well as Concho Valley Tech Prep Consortium members.

The simple organizational structure of the Summer Jobs For Youth program and the well-established intersector cooperative climate led to its operational success, despite a short start-up time. The three-stage approach to developing the program began with a commitment to the concept by someone who possessed high name recognition and a high level of respect throughout the area, who served as a catalyst for the program. Naturally, this high-profile commitment led to a willingness of potential program partners and businesses alike to participate. Each program partner could easily join and cooperate with other partners, because each was asked only to provide services it was already performing in the course of its regular activities. Each business could easily pledge support for two specific reasons. First, the minimum financial commitment required (approximately $510 per position at current minimum wage) was within easy reach of the majority of employers. Second, while employers were still bound by state and federal employment laws, no new or additional governmental restrictions were placed upon them for participation in the program.

Likewise, the four-stage operational plan worked well within the short time frame. The orientation session was easy to develop, and offered students a short, concise introduction into the world of work. The organization of job orders and student applications by age, category, and skill level, lent itself to an efficient process for ultimately matching students with appropriate jobs. Students and businesses were active partners in the job search/selection process, with both interviewing until all positions were filled. Even those students not fortunate enough to obtain a position the first year gained valuable experience that will help them in future job searches. Finally, through the simple evaluation process, program partners were quickly able to analyze the strengths of the existing program and make changes as needed.

The Summer Jobs For Youth program is a low-cost, easy-to-organize effort that produces big rewards for everyone involved. Students gain valuable experience in the overall world of work, an employment history which increases employability in future years, and insight into the specifics of possible lifelong careers. At the same time, they learn personal responsibility and earn money they need now. Educational partners gain a new avenue for integrating school- and work-based education for the area's overall School-to-Work and Tech Prep plans. They also gain a deeper insight into how work skills can be better incorporated into Tech Prep and other educational curricula to provide increased opportunities for lifelong learning. Finally, businesses have the opportunity to serve as role models for their future employees and can provide knowledge to students that cannot be taught in a regular classroom. They also gain additional part-time help at a time when regular employees normally take vacations, and they have the opportunity to work in tandem with educators to adapt curriculum to meet the needs of business in the 21st century.

The Summer Jobs For Youth program is a win-win situation for students, education, and business, both for today and for the future. The organization is simple, the operational costs are low, the benefits for all participants are significant, and it is adaptable to almost any setting. It is a valuable Tech Prep complement that deserves widespread consideration for replication in other areas. As Tom Green County participates a second year and six additional counties initiate the program in 1996, the truth of the program's motto is proven daily: "It's an investment in the future that is well worth the price!"

THE IMPORTANCE OF PRIVATE-SECTOR LEADERSHIP IN TECH PREP

by
Cesar Maldonado
President
Tex-Steel Corporation
P.O. Box 992
Harlingen, TX 78551
(210) 423-0912
and
Pat Bubb
Executive Director
Tech Prep of the Lower Rio Grande Valley, Inc.
TSTC Conference Center
2424 Boxwood
Harlingen, TX 78550-3697
(210) 425-0779

> ***He who influences the thought of his time***
> ***influences the thought of all the times that follow.***
> --"Gentleness," *Apples of Gold*

Texas' state leadership has provided for a statewide Tech Prep system that is unique -- one that emphasizes regional collaboration and private-sector leadership. Tech Prep in Texas is the continuation of work begun in 1987, when the Legislature divided the state into 24 Quality Work Force Planning Regions and urged regional leaders to plan for the development of a high-skills, high-wage workforce. Since its implementation in 1991, Tech Prep has enhanced Texas' Quality Work Force Planning initiative. The once-void teaming of public-private collaborative is now a network of 25 Tech Prep consortia that have successfully merged the private sector's needs with the public's delivery systems.

Tech Prep has focused on meeting the needs of students and employers and has encouraged out-of-the-box thinking and innovative leadership: characteristics found most often in private-sector entrepreneurs. Tech Prep's state-level leadership has created an effective balance between the administrative oversight required for fiscal accountability and the regional freedom required to keep the private sector at the table.

I am looking for a lot of men who have an infinite capacity to not know what can't be done.
--Henry Ford

Due to the decline of the petro-chemical and agriculture industries in the early 1980s, Texas realized an erosion of the economic prosperity that it had enjoyed for decades. Searching for ways to diversify the state's economy, Texas created 24 regional Quality Work Force Planning Committees comprised of private- and public-sector leaders. State-level governance for the committees was vested in a tri-agency partnership including the Texas Education Agency (TEA governs K-12 education), the Texas Higher Education Coordinating Board (THECB governs public colleges and universities), and the Texas Department of Commerce (TDOC). Each committee was encouraged to study the region's economy and growth patterns and to identify the most probable "best jobs of the future." These jobs were identified as "targeted occupations," and the committees were encouraged to design and implement educational programs that would yield workers who could fill those jobs.

Texas' Tech Prep system was linked to the state's Quality Work Force Planning system, and Tech Prep governance was vested in the same tri-agency that governed Quality Work Force Planning, with TEA serving as lead agency for Quality Work Force Planning and THECB taking the lead on Tech Prep. The Tech Prep consortia became the "education division" of the Quality Work Force Planning bodies. Tech Prep's state-level mission was to develop and implement educational programs that would produce workers for the targeted occupations and to implement support systems for the students in those programs. The state's goal was to help each region to develop a cadre of high-skills, high-wage jobs and thereby to help the state to prosper.

Quit now, you'll never make it. If you disregard this advice, you'll be halfway there.
--David Zucker

To accomplish their mission, the Tech Prep consortia had to produce systemic change in public education, especially in the K-12 system. Tech Prep was given a challenge that multiple federal education reform initiatives had failed to meet. Because of the repetitive nature of history and the prior unsuccessful attempts to accomplish this goal, "experts" believed that Tech Prep would not succeed in achieving its goals. The experts' beliefs, although understandable, failed to consider that regional freedom would result in a high commitment from the private sector, a component crucial to the success of such a program. The desire of private-sector employers to take key leadership roles emerged as the best and brightest hope that Tech Prep had to produce the necessary changes in educational systems. As a result, Texas' Tech Prep network began focusing on collaboration anchored in private-sector leadership. Nowhere is this process illustrated better than in Texas' Lower Rio Grande Valley, which is located along the border with Mexico, and whose economy is greatly affected by its proximity to Mexico.

The Valley is geographically and culturally isolated from the rest of the state and is a region of extremes, having both enormous potential and tremendous problems. The Valley has led the state in economic growth for the past five years, and the economy is continuing to expand. The Valley's challenges include double-digit unemployment on both sides of the border; high dropout rates in US public schools; high youth and adult poverty rates on both sides of the border; a welfare-fueled economy; instability in the Mexican economy that affects the Valley's economy; Texas public schools that have to deal with teacher shortages, large numbers of migrant children, and an influx of illegal immigrant children; and the many and varied social problems that go hand-in-hand with poverty.

The Valley's population is predominantly Hispanic (85 percent) and is one of the youngest populations in the United States. (More than 40 percent of the population is younger than 20 years of age, and this is one of the fastest-growing segments of the Valley's population.) This youthful population is growing up in a binational, bilingual, multicultural environment and is a rich resource -- a resource which if groomed appropriately can be the world-class workforce required to make the Valley and the state strong competitors in a global marketplace.

Trouble creates a capacity to handle it.
-- Oliver Wendell Holmes

Giving Valley youths the opportunity to receive adequate education, skills training, and opportunities was the challenge that Tech Prep assumed in 1991, a challenge that at first glance seems unattainable. Nearly 53 percent of the residents of the Valley have less than a high-school diploma, compared with less than 28 percent for Texas and less than 25 percent of the entire United States. Some 40 percent of Valley residents ages 25 and older have less than a ninth-grade education. In addition, the Valley has fewer people with degrees in its workforce than are found in other regions. Less than 12 percent of the Valley's population has some bachelor's degree training, while national and state averages exceed 20 percent.

Understanding fully the challenges that they faced, the Valley Tech Prep's leaders have created a consortium that is beginning to elicit the types of systemic changes in education that were envisioned when Tech Prep began. A lot of the credit for the changes emerging goes to the influence and vision set by the private-sector entrepreneurs who have provided the leadership for Tech Prep, and to the educators whose knowledge of the system was critical in defining a delivery plan. The consortium still has a lot of work to do, and many needs remain; however, significant progress has been made because the consortium has honored the recommendations of its private-sector leaders. Tech Prep's first Board Chair was an engineer who was already serving as the Education Development Committee Chair of the regional Quality Work Force Planning Committee. The Valley's Tech Prep consortium began to build an educational system that did not exist when Tech Prep started -- a system that would support the development of the manufacturing-based economy in the Lower Rio Grande Valley. The consortium ultimately entered into a collaborative partnership with the National Center for Manufacturing Sciences (NCMS) in Ann Arbor, Michigan, using Tech Prep funds to acquire a Manufacturing Technologies Laboratory (MTL) from NCMS. The consortium is still using this MTL today, as a preparatory tool in middle school, showing students and their parents the lucrative and rewarding careers available in high-tech occupations. Originally funded from the Tech Prep budget, the MTL program is now supported entirely by contributions of the school districts that benefit from these services.

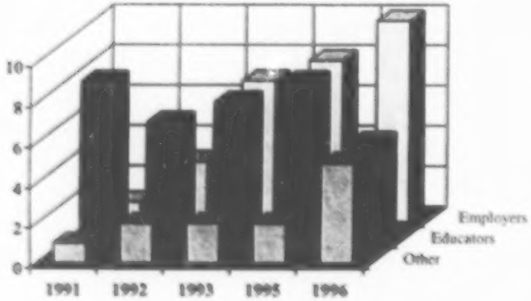
In allowing the Valley's consortium to acquire its MTL, the state's leadership demonstrated the type of leadership that characterizes Tech Prep at the state level -- a type of leadership that maintains accountability for federal funds, but which gives regional leaders the freedom to create the best possible educational systems for their regions.

Creativity can solve almost any problem.
The creative act, the defeat of habit by originality, overcomes everything.
--George Lois

Had the state not allowed this regional freedom, the private sector's involvement would have been compromised, thus preventing the input necessary for the development of a successful plan. Because the state allowed this freedom to create regional plans that meet local needs, the private-sector representation on the Valley's Tech Prep Board has increased from year to year. The chart below depicts the board membership, illustrating the growth in private-sector participation.

Tech Prep Board Membership

1991 - Present



The success of the initial goals coupled with the enthusiasm of the Board has resulted in a positive consortium culture and created a climate that encourages systemic change. The consortium is now organized as a Texas nonprofit and federal 501(c)(3) corporation, and its board operates like a private-sector business corporation's board. All of the members meet semiannually, and new Directors are elected in October of each year. The Directors give an accounting of their actions at every members' meeting, and communication with the members is emphasized between meetings. In the summer of 1994, the consortium conducted a six-week mathematics project that utilized Tech Prep's MTL and Tech Prep-style algebra. Ninety percent of the program participants (98 eighth-grade students from three different school districts) improved their performance by an average of 12.1 percent! The Valley's Tech Prep served as the state's first School-to-Work pilot site under the Texas Council on Workforce and Economic Competitiveness and also led regional planning for School-to-Work implementation.

Most employers these days are more interested in performance than conformance.

--Henry Ford II

The result of the Valley's Tech Prep initiative is that the Valley's educational systems are in fact beginning to change. Thirteen Tech Prep/Associate Degree curricula have been developed and implemented, including one program designed especially to meet the needs of the region's plastics manufacturing industry. All three colleges are participating in Tech Prep, with five additional Tech Prep programs currently awaiting approval by the state's leadership team. More than ten additional programs are under development and consortium membership has expanded from an initial 11 school district members to a current 31 school district members. College members have begun to design and implement "bridging" programs to allow adults already in the workforce to access the Tech Prep programs at the colleges.

Tech Prep has served more than 10,000 students with its MTL since June 1993, and there are almost 3,000 high school students and 800 college students enrolled in Tech Prep programs at this time. High schools have begun to restructure; many districts have redesigned their class day schedules, and many high schools have begun to teach technology systems, manufacturing graphics, manufacturing systems, and other new courses. Several school districts have begun to infuse "real world applications" into their academic classes and also are involving growing numbers of students in SCANS-based learning[1]. Numerous school districts are implementing career pathways systems that encourage all high school students to select a career major at the beginning of each school year. These career-major systems enhance students' performance by offering them courses that relate to their interests and help the students to see the relationship between school and "the real world." Collaboration and resource-sharing among school districts and colleges is growing, and hundreds of Valley educators have participated in professional development on topics such as integrating academic and technology education; infusing real-world applications into English, math, and science; adapting teaching styles for students' learning styles; developing and implementing career-pathways systems; and understanding global competition and the economic realities of preparing students to find work in a knowledge- and technology-based economy.

The positive long-term impact of the systemic changes underway in the Valley on the academic performance of the Valley's youth is illustrated by a study that the Brownsville Independent School District made of 596 tenth-grade students in 1995. The District compared the performance of four student groups on the Texas Assessment of Academic Skills (TAAS) exam that the students were all required to take under Texas law. Two hundred and eighty of the students tested were enrolled in "general" studies and were not taking any career and technology education classes; 208 students were taking one career/tech education class as an elective; 77 students were enrolled in a High School of Technology for Engineering, and 31 students were enrolled in a Tech Prep engineering-related cluster. The students' performance (percentiles) is illustrated below:

---

[1] SCANS is an acronym for "Secretary's Commission on Achieving Necessary Skills" and refers to reports issued by the United States Department of Labor in 1991 and 1992.

Student Group	Reading	Math	Writing	Overall
(208) General Studies	30	12	57	13
(208) CATE Elective	49	37	67	25
(77) High School of Technology for Engineering	99	95	100	92
(31) Tech Prep	71	61	94	62

Both the High School of Technology students and the Tech Prep students outperformed their classmates on the TAAS test by wide margins. The students attained these scores while participating in restructured class days that allowed them to take a structured sequence of courses and still to participate in electives that interested them, such as band, choir, and sports. The potential impact of the focused, academically rigorous, applications-rich curriculum such as Tech Prep requires is profound. The systemic changes that are underway can be attributed not entirely, but in large measure, to the work of the Valley's Tech Prep consortium in focusing educators', students', and parents' attention on the advice and direction of the Valley's private-sector leaders.

The great aim of education is not knowledge but action.
--Herbert Spencer

Tech Prep has succeeded in fostering genuine collaboration between the Valley's educators and employers in ways that had not occurred prior to 1991. The consortium's director has become an "interpreter/facilitator" who assists the communication process between these groups. Prior to Tech Prep in the Valley, private-sector leaders who wanted to help education usually gave money to schools and left it to the educators to decide what to do with the money. Employers operated in a world where competition necessitated increasing emphasis on productivity and excellence and a focus on getting value out of every dollar spent. Educators, though involved in federal education reform initiatives, lived in a world that demanded short-term results for a problem that really requires a long-term "fix" -- a bureaucratic world in which long-term planning and a focus on excellence were the exception. This situation was exacerbated by the demands of a maze of bureaucratic rules and regulations that stifled creativity and innovation. Although these problems have not disappeared, one can definitely feel a "breath of fresh air" flowing through the Valley as growing numbers of people have begun to catch the excitement of working together to create systemic change. Bringing educators and employers together in a consortium and putting the focus on the leadership given by the private-sector leaders has created an environment in which ideas can be shared, problems can be addressed, and enthusiasm can be "caught."

> ***Where there is no vision,***
> ***the people perish.***
> --Proverbs 29:18

The importance of the role played by the visionary private-sector entrepreneurs who serve on the Tech Prep Board cannot be overstated. For the many educators who have moved from being in the classroom as students to being in the classroom as teachers, counselors, and administrators, Tech Prep has created a forum in which they can begin to understand life outside academia for the first time. Tech Prep's private-sector leaders have been given a platform from which they can speak meaningfully to the educational community and a setting in which they can begin to understand the dynamics of that educational community. The result is that public- and private-sector leaders have come together and focused on a shared vision: a vision that calls for academic and technical literacy for all students and the development of a world-class workforce in the Valley. Because the state has given them freedom to lead, Tech Prep's private-sector leaders have remained involved and their numbers continue to increase.

Tech Prep in the Valley was one of the first Tech Prep consortia in the state to place its primary emphasis on private-sector leadership, and this approach has proved so successful in the Valley that state leadership has begun to insist that other Tech Prep consortia also focus on meaningful private-sector leadership in their regions to guide the Tech Prep implementation process. George Bernard Shaw said that "the people who get on in this world are the people who get up and look for the circumstances they want, and, if they can't find them, make them." Texas' focus on regional collaboration and private-sector leadership is creating the circumstances necessary for meaningful educational reform and economic opportunity. This approach should result in continuing success in the future: **education is too important to be left solely to the professional educators!**

MOTOROLA CAREER PATHWAYS PROGRAM: FROM SCHOOL-TO-WORK TO WORKFORCE DEVELOPMENT

by
Sharon Knotts Green
External Education Manager, Motorola
Semiconductor Products Sector
3501 Ed Bluestein Blvd.
Austin, TX 78721
(512) 933-5123

During the 1994-95 school year, the Motorola Semiconductor Products Sector in Austin, Texas piloted Career Pathways, a work-based learning program for youth. Unlike the company's other youth employment program targeted at future engineers, Career Pathways was designed for the average student. The goal of the program was to help meet the company's short-term workforce needs by employing students who may not attend college immediately following high school, but were interested in careers in an area of Motorola's business need. This article will outline the major steps taken to implement the program with the intent to help others who are seeking to develop work-based learning programs for youth. Implementation steps and recommendations are more completely discussed in my doctoral dissertation entitled *School-to-Work: An Employers' Views* (Green, 1996). Recommendations for program implementation are also discussed in the Motorola case study presented in *School-to-Work Programs Infoline* (American Society for Training and Development, 1995).

Educating Stakeholders. Those who desire to form school-to-work (or school-to-career) programs may wish to begin by educating themselves on the philosophies behind these programs. This knowledge will help program developers clarify goals for their programs and address stakeholders' concerns. The primary issue will most likely be that of perception since people are generally more familiar with the vocational education programs of old than they are with the new career and technology programs now available. Parents often have difficulty believing that their children may not go to college upon graduation and that there are viable career opportunities available which do not require a four-year degree. Students may be reluctant to work in predominantly adult-

© 1996 Motorola All Rights Reserved

dominated environments. Educators may feel that participation in school-to-work programs will close college options for students or relegate them to a lifetime of low status jobs. Employers may view work tasks as being too complicated for high school students or fail to connect school partnership programs with the company's workforce development strategy.

Business and education committees and boards can help prepare program leaders by introducing them to existing programs, available resources, and possible partners. Some of the groups that served this role in Austin were the Greater Austin Chamber of Commerce Education and School-to-Work Transition Committees, the Mayor's Task Force on Youth Apprenticeships and Career Pathways, the High Tech Steering Committee of the Capital Area Training Foundation, and the Capital Area Tech Prep Consortium. Members in these organizations included business leaders, educators, human resources personnel, community college representatives, and researchers. The meetings provided forums for exploring viewpoints of different stakeholders, learning about new programs and understanding recent legislation. Members also took advantage of the opportunity to network with others for program operation ideas and collaboration possibilities.

Determining how to adapt a program for a given community or environment can be accelerated by visiting programs in operation. In 1993, the Center for Learning and Competitiveness at the University of Maryland sponsored five study tours to European sites where highly developed school-to-work transition systems were in operation. Team members visited vocational schools, talked with business, government and labor leaders, and shared insights about how they might establish school-to-work systems in our respective communities. I was a member of the governance and finance team chaired by Dr. Robert Glover of the LBJ School of Public Affairs at the University of Texas at Austin. This experience helped me to see the necessity for early career exploration and the role of employers in preparing youth for adulthood. A complete report of the team's findings is given in *School-to-Work Transition in the U.S.: The Case of the Missing Social Partners* (Glover et al., 1994).

Assessing the Company Environment and Existing Resources. Motorola had participated in partnerships with schools since joining the Austin community in 1975. As a result, there were already company resources available and processes in place which could be used toward building a school-to-work program. National and corporate events also helped pave the way for beginning Career Pathways.

One of the most significant events leading to Career Pathways was the creation of my position as external education manager. I was responsible for the company's strategic involvement with the K-12 education system. The position created a focal point for K-12 issues and made these issues a primary job function. I was highly motivated to participate in the organizations mentioned because I was anxious to network with others who had similar job functions in other companies.

Motorola's participation in the Texas Alliance for Minorities in Engineering (TAME) summer employment program gave the company experience in socializing youth into the workplace and developing work-based learning experiences for youth. The staffing office representative responsible for hiring high school students during the summer became a great resource for setting up a year-round employment program. The company had also built strong relationships with its adopted schools who participated in the TAME program. Two of Motorola's adopted schools served as partnership schools for the Career Pathways pilot.

There had been an attempt by one department to close the feedback loop between schools and employers by hiring graduating seniors from its adopted school. The manager who had provided leadership for this preferential hiring program commented that administrative tasks and communication issues prevented the program from becoming permanently established.

The chef at one of Motorola's facilities had also allowed students from the culinary career and technology program at a nearby school to shadow his employees two to three times per week. The partner school was not selected for the pilot, but the department manager was consulted for his skill in working with youth.

Like other high tech employers in the Austin area, Motorola was having difficulty finding employees who met the company's hiring criteria. Considerable resources were being spent on remedial training for incumbent workers and new applicant screenings. Students who were able to pass the basic skills test often failed the workplace practices portion of the test which required students to view different work scenarios and then respond as to how to handle the situation presented. Once hired, young new employees were often released for poor attendance or attitudinal problems. These trends piqúed the human resources department's interest in exploring the use of school-to-work programs to increase the number of qualified applicants for entry-level positions.

There were several factors preceding program development which impacted the company's ability to launch Career Pathways. Among other factors, Motorola had a structure for participating in school partnerships, experience in developing work-based learning programs for youth, and a need for qualified new employees.

Identifying Challenges and Recruiting Help. Beginning Career Pathways within the company would eventually require approval by upper management. Its success would also require support from students' fellow co-workers. The information received in various meetings became excellent discussion points for informal conversations with managers and employees. The objective was to determine these groups' concerns prior to fully developing the program and identify supporters who could assist with program tasks.

Regular company meetings and reports became opportunities to share insights gained from school-to-work meetings. I included the activities of the various organizations in written monthly reports and operations meetings with upper management. I interviewed managers in human resources to determine the extent to which Motorola's hiring and firing trends mirrored those of other local companies and those discussed in the literature. Representatives from Motorola's legal department helped me distinguish between legal requirements and traditional company practices. I also asked those who had supervised TAME students to relay their experiences with youth in the workplace.

These sessions provided valuable information which I later used to establish program guidelines. Upper managers tended to ask more questions regarding how the program fit into the company's external relations strategy. Department managers were more interested in how the program would operate day-to-day. Those who had supervised youth in the workplace pointed out that they had benefited from the experience just as the students had. I learned which departments had the most difficulty employing entry-level workers. Based on the quantity and types of questions asked, I began compiling a list of managers who might want to participate in the program.

An unanticipated outcome of sharing the concept of a school-to-work program with different audiences was that those who heard my presentations began directing others who were interested in the idea my way. Some of those who contacted me wanted to have their departments participate. However, most people wanted to know how their child could register for the program.

After receiving approval from my management team to proceed with the program, I hired a graduate student from the University of Texas to perform administration details. A student was employed in this capacity throughout almost the entire pilot program period. One of the company's vice-presidents also recruited a department manager to help me secure student positions.

Establishing Program Goals and General Guidelines. The program's goals and operation procedures stemmed in part from comments by managers at various levels. I reasoned that this population was the main gatekeeper for starting the program. Upper management approval was needed before approaching department managers. Department managers were the ones who would be asked to host students in positions within their departments. The goals were also shaped by a personal desire to promote school-to-work programs among other employers in the Austin area.

Career Pathways was established with the primary goal of providing a work-based learning experience for youth in an area of student interest and Motorola's entry-level workforce need. A second goal for the program was to position a high school school-to-work program as a component of the company's workforce development strategy. The third goal was to add to the body of literature on implementing School-To-Work programs from the company's perspective. Career Pathways was also intended to be a learning experience to help prepare me to operate a year-round school-to-work program on a larger scale.

Specific features of the program included the following:

- A year-round program with students working a few hours each day allows students to quickly become independent employees.
- High school juniors are preferred so that students would have at least two years of work experience before leaving high school.
- Students working at least 20 hours per week may take advantage of Motorola's benefits, but more than 25 may interfere with school work.
- Enrolling students in career and technology programs allows students to be given school credit for work-based learning and accommodates managers' desire for students to work during the first shift.
- A three-year program allows bridging from high school to a post-high school training experience.
- 95 percent attendance is required for all students since attendance was the top reason new employees were dismissed from the company.
- Students are selected from two adopted schools located in close proximity to Motorola's two manufacturing sites.
- Students are required to complete weekly reports and periodic program evaluations to monitor implementation process.
- Managers are required to submit a training plan for students.
- Career Pathways was to not negatively impact the TAME summer hiring program.

Identifying Positions. As mentioned earlier, student positions were generally identified through an informal process which included asking managers for feedback on entry-level positions that were difficult to fill. Some clerical and accounting positions were already being considered by supervisors when they learned that I was starting a specific program to hire students year-round. I also inventoried the types of career and technology programs available in the Austin Independent School District, particularly those at the two schools that would participate in the pilot program. The high schools selected for the pilot program operated career and technology programs in office administration, food service, and technology.

One plant manager indicated that there were few new employees who came to the company with experience in ultra-pure water. There was only one university in the country that offered degrees in ultra-pure water. A conversation with a another plant manager revealed that entry-level operator positions in ultra-pure water plants paid higher salaries than other operator positions. The manager also pointed out that operators already employed were unable or unwilling to participate in special training programs for ultra-pure water workers. A manager in this group requisitioned for two student positions.

The management of the same department that had experimented with the preferential hiring program decided to provide one student position in its supply department. This department's primary activity was wafer manufacturing, a restricted area for students due to the presence of radiation in the work area.

Initially, the focus of the program was on technical positions as this was Motorola's mainstream business, but supervisors with openings in clerical and accounting departments expressed interest in the program. One secretary to a vice-president submitted requisitions for two students. An accounting manager requested one position. One position in food service at each of the two manufacturing sites also became available. Career Pathways began with a total of eight positions -- three in technical departments (ultra-pure water and manufacturing) and five in non-technical areas (FoodWorks, clerical, and accounting).

Selecting Students. The relationships established with school personnel was most beneficial during the participant selection phase of the program. Two of Motorola's adopted high schools were selected for the pilot program. Counselors and teachers performed all school-related tasks, including arranging for me to talk with selected students about the program, obtaining student transcripts, and addressing student behavioral problems on the job.

The tenth grade counselor was the initial contact person for the program since the program was aimed at high school juniors. The counselor at one school selected students to attend a presentation about the program. Students were selected to attend the session based on the following criteria:

- Have at least a 2.0 GPA,
- be 16 years of age,
- be an 11th grader by fall 1994,

- at least one year each of math and science,
- have completed at least two years of English,
- and have no short- or long-term suspensions as a result of possession of firearms, willful assault, theft, etc.

A hiring manager could choose to waive one or more of the criteria with the consent of the student's counselor and teacher. All students completed Motorola employment forms and submitted to mandatory drug testing at the time a job offer was made.

Inspired by the "Meister" concept found in the European apprenticeship system, I decided to experiment with the idea of supervisors selecting students to work in their departments. The belief was that if managers were allowed to select the students themselves, they would feel a greater responsibility for the students' development.

I was allowed to observe some of the interviews with the students. I discovered that students generally failed to elaborate on their prior work experiences and how those experiences related to the job they were seeking and their personal goals. The students failed to convey their interest in the position by asking questions and did not appear to be interviewing the company for its ability to meet their needs. Consequently, hiring managers found it difficult to assess whether or not the work would be interesting to the student as hiring criteria. Therefore, the managers tended to select students based on appearance and SCANS skills, such as speaking ability and social skills, rather than on demonstration of career interest. The two students selected for the positions in FoodWorks were both seniors enrolled in second-year food courses in their high schools. The clerical and accounting positions were filled by students (one junior and two seniors) enrolled in business and office education programs. The technical positions were filled by senior students who were enrolled in technology education programs, although the curriculum of these programs did not fit the type of work the students would be doing on the job as did the other positions.

To summarize, eight students were hired to fill positions in ultra-pure water, manufacturing, clerical, accounting, and food services. The grade point averages of these students ranged from 1.5 to 3.6.

Evaluating and Modifying the Program. The Career Pathways pilot program achieved the majority of the goals set forth for the program. Three of the students are now full-time employees and performing well on the job. One student is enrolled in Austin Community College while working part-time with Motorola. Two students are considering enrolling in the community college in Spring 1997. One student decided to attend college full-time out-of-town. His department expects to hire him during the summers through the university summer hiring program. The two students who worked in food services were released from the program due to poor attendance and work performance. Both students expressed disappointment in the type of work they were doing and desired careers in fields unrelated to food service. One student in a clerical position was also released from the program due to poor attendance and performance. She confessed to having family problems that affected her ability to get to work regularly and on time. She also stated that the work was not what she had anticipated. One student was released from the program after only a couple of weeks. She seemed to have difficulty with basic social skills such as being sociable and courteous, alienating her from her supervisor and work team.

There was general support for doing enough prework to ensure the program's success, but not so much prework that the program would be delayed several months. The managers and I agreed to conduct regular informal sharing sessions. During these sessions, we discussed the types of work tasks the students were performing. The managers also shared short stories that illustrated the students' growth in maturity and skill.

Students were usually interviewed by the graduate student. I reviewed their weekly reports and followed up on any issues they had specifically raised. One of the lessons I learned during the meetings with the students was that the students longed for formal opportunities to gather as a group. The TAME students take a presentation class together and periodically have group meetings. They are also more likely to already know each other because they often come from the same school or have seen each other at other TAME events in the city. The Career Pathways students were from different schools and only saw each other at orientation. Motorola's culture does not discourage employees from setting up their own meetings with one other, but this had not been adequately explained to the students. By the end of the second semester, some of the students had begun to eat lunch together.

Based on the information exchanges, the length of the pilot program was changed from three years to two years. Since seniors were selected for all but one position, the bridge to a post-high school learning experience was possible. The students were also performing so well on the job that the managers were anxious to promote them to a more permanent status.

There were some beneficial ancillary effects of the program. A supervisor in the ultra-pure water group was promoted because the student could perform routine tasks, allowing the supervisor to address more difficult problems. One supervisor confessed that her stereotype of teenage mothers had changed. The teenage mother she supervised was an "A" student and displayed an exceptional work ethic. Another supervisor expressed deep personal gratification in working with her student. This student had talked with her counselor about dropping out of school when she was selected for Motorola's Career Pathways program. She graduated with her class in June 1996 and received an award for her work at Motorola.

Conclusion. Motorola recognizes that it can only reach its business goals through the efforts of qualified and motivated employees. The Motorola Career Pathways pilot program sought to address the issue of the lack of an efficient method by which high school seniors might enter the workplace in entry-level career positions. Eventually, Motorola hopes to link its program to a system which allows students to explore career options through daily coursework, field trips, and work-based learning experiences.

References

American Society for Training and Development 1995. *School-to-Work Programs* (Infoline). Alexandria, VA.

Glover, R. W., A. Weisberg, A. M. Churchill, S. K. Green, R. McPherson, J. Lewis, Q. Rahbeger, M. Scott, & F. E. Scott. 1994. *School-to-Work Transition in the U.S.: The Case of the Missing Social Partners*. College Park, MD: Center for Learning and Competitiveness, University of Maryland.

Green, S. A. K. 1996. *School-to-Work: An Employer's Views*. Ph. D. diss., University of Texas at Austin.

WORK THAT EDUCATES: HOW TO MAKE STRUCTURED WORK-BASED LEARNING WORK

by
Robert A. Egloff
Apprenticeship Consultant & Industry Liason
Capital Area Training Foundation
800 Brazos St., Suite 1305
P.O. Box 2026
Austin, Texas 78768-2026
(512) 474-2710

This article focuses on developing the worksite element of occupational education, with practical suggestions on how to make structured work-based learning work as an equal complement to school-based learning. In this first part, I want to give a few background thoughts about School-to-Work in general and where work-based learning fits in. The second part is a ten-step, hands-on, how-to guide for companies to set up the work-based learning component.

Emphasis is placed on two parts of the Basic Model: Technical Skills and Worksite Learning Plans. SCANS-Skills and Methods of Teaching are mentioned in connection with assessments and mentor training. The other elements are equally important to good occupational education, but are just not discussed here.

The Basic Model

	Worksite	**Both Sites**	**Classroom**
Goals	*Technical Skills* - Skills Standards - Duty & Task Lists	*Foundation Skills/ Core Competencies* - SCANS-Skills	*Knowledge* - Technical - General
Steps	*Worksite Learning Plans* - Rotation Plans - Assessment System	*Methods of* - Learning - Teaching	*School Curricula* (Secondary and Post-Secondary)
Exams	*Practical Exams*	*Forms of Exams*	*Theoretical Exams*
Certi-fication	*National Certificate of Competence and Industry Certification*	*Letter of Recommendation*	*A.A.S. Degree or Certificate or Higher Degree*

The Basic Model -- a help for orientation. Good occupational education, for a broad range of occupations from medical doctors to chefs, should include all the elements of this basic model. There should be three basic thoughts behind defining these clusters.

- What kind of multi-skilled people does the industry need in the future to maintain a world-class service or manufacture world-class products?
- What kind of knowledge and skills must these people have?
- What is the nature of duties and tasks they must perform?

How Educational Institutions and Industry can Work Together. After having been a part of School-to-Work for a little over a year, and having traveled around the country extensively to give presentations at conventions and state conferences, I realized a few things. There still are places in the U.S. where industry does not really care about what is happening in the schools and are just complaining about the schools failing to do their job. (At least complaining employers realize the current system isn't working very well.) That's stage one. We're fortunate in Austin to have a lot of firms teaming up with schools to help them do a better job of educating students. That's stage two. Now, I think it's time for stage three. Industry needs to take over the responsibility for the work-based education of American youth. Industry needs to formulate their visions and goals for their future in a highly competitive world market and identify the role of the generation that's now in elementary, junior, and high schools. Industry should set up a training system to prepare youth to be a leading part of their vision. The responsibility for workforce preparation needs to gradually move from the schools to the firms, with schools, colleges, and universities teaming up with them to do the job. In the past, educational institutions were made fully responsible for everything that even remotely resembled education; educational institutions have to get used to this new process as well.

	Industry Awareness Levels
Stage 1	Criticize the school system.
Stage 2	Support schools for social image and community reasons.
Stage 3	Assume responsibility for structured work-based learning and get involved in related school curriculum!

	Educator Response Levels
Stage 1	See business/industry as potential enemy.
Stage 2	Use suppliers and worksite experiences as "playscapes" to motivate students.
Stage 3	Assume a 50/50 partnership with industry in time allotment, credentials, responsibility, supervision, decision making.

Comparing School- and Work-based Learning Approaches. Partnerships between different learning places and partners need to be constructed under a 50/50 assumption, rather than assuming the workplace as an addition to the schools. In true partnerships, classroom education and structured work-based learning go hand-in-hand, reinforcing each other. There is neither a primary, nor secondary learning environment; both entities are equal partners. Educators and employers need to discuss and compromise on their two different approaches to school- and work-based education.

In a more work-based system:

- The availability of educational possibilities depends on the needs and the future needs of the economy. Business is in the driver's seat.
- Workplaces are considered a good environment in which to learn.
- The fact that learners have different learning styles is accepted and taken into account.

In a more school-based system:

- Students' abilities, parents' wishes, and teachers' preferences determine which educational paths are offered, often with no reality check confirming that skills are needed in the labor market.
- The classroom is considered the best place to learn.
- The student who learns well in the classroom is praised and promoted.

Let's face it: classrooms are only one of the many learning environments to which students are exposed. Other environments include television, peer groups, sports and music activities, families, churches, the natural environment, etc. The workplace can help students in transition to the world of work, the world of adulthood, the world of their future lives. Schools worldwide tend to be sheltered refuges that don't replicate the real world and are, therefore, not very well suited for the workforce preparation needed. There are some basic differences that need to be discussed and worked out between the stakeholders when creating real world occupational education.

A Very Short and Pragmatic Guide to Set Up Structured Work-based Learning. The following is a nine-step program designed to help businesses set up a good learning environment for structured work-based learning.

The first step is to determine what learning environments exist and what elements are in place in firms of the industry. Find out what different departments are doing; make a list of all the activities performed. Which ones must be mastered by student learners? This leads to a Checklist of Duties and Tasks for the student learners (See Figure (1) following the article).

Differences between	
school-based programs	**work-based programs**
-arranged according to schedule	- hours, shifts, days are important
- school buses for transportation	- students' own transportation
- often unpaid	- paid
- busy work	- real work
- teachers responsible for workplace learning	- industry mentors responsible for workplace learning
- graduation credits	- often no graduation credit
- focus on school's/students' needs	- focus on industry's need
- may change from semester to semester	- learning objectives for several years
- input oriented	- output oriented, TQM
- career sampling	- career preparation
- Goal: work exposure	- Goal: management position/ career

The second step is discovering why these activities are performed. What are the ends behind the means? This leads to a List of Learning Goals with specific goals and their purposes.

What skills need to be learned? At what level of performance are they mastered? When these questions have been answered, you have begun a list of Measurable Skill Standards. (Note: There are 22 national contracts to industry groups and educators to develop voluntary skill standards in their industry; most of the skills standards are now available.)

The fourth step is to decide what the appropriate duration of learning experiences in the respective areas is to acquire the skills for the required activities/tasks and to reach all the respective goals. This leads to the Duration of Every Training Period. If an employer has just one student learner, the duration of rotations may be of variable length. If the employer has two or more learners, you might want to use a standardized time period, such as one, two, three, four, or six months and stagger student learners' schedules, avoiding gaps and overlaps.

A Rotation Plan logically sequences tasks, so that the student learner is moving from easier tasks to more complicated ones. Again if you have one student learner, it is difficult to have a scheduling problem. If there are several student learners rotating through the same departments, you will find that they all have different rotation plans. Make sure that they all are going through the same departments during the same year. (See Figure (2) following this article.)

How are the student learners assessed at the end of each training period in each department? What kind of forms should be used? Establishing a process of assessment, qualification, information, skills certification for each training station is the sixth step. Be sure to allow enough time to talk about assessment with each student learner. This leads to a Set of Qualification Sessions and Forms to be used after each training station. (See Figure (3) following this article.)

The seventh step is to find mentors or coaches who will be responsible for on-the-job training. Mentors and coaches are people who like to work with young learners, have a master-level knowledge of the occupation, and are good teachers of what they know. Identifying and selecting the right group of mentors or coaches will lead to a very motivated group of employees.

The eighth step is to arrange training for the mentors and coaches to prepare them for their new part-time job. They need not only broad occupational knowledge (like the Meisters in Germany do) but should also be able to communicate well with learners even in difficult situations. (See Figure (4) following this article.)

Finally, the last step to consider is that in larger firms or consortia of small firms, where ten or more student learners need to be accommodated each year, it is recommended that a person be designated responsible for the student learners (from hiring through graduation and after), also serving as the in-house-contact for all your mentors and coaches. This could be a manager of the School-to-Work department or a School-to-Work coordinator.

Conclusions. Structured work-based learning is an imperative component of every good occupational education. Nobody wants to have surgery performed by a physician with little or no prior supervised practical experience. The same is true for almost all other occupations.

I urge companies to get into the driver's seat and to consider workforce preparation of our teenagers to be their business. We all want youth to function well in our companies in the future. Industry needs to get in touch with local School-to-Work or Tech Prep facilitators today. They are very interested in helping us shape the workforce of the future. Let's start today to have the graduates ready when we will need them most -- Tomorrow!

Figure (1): Duty and Task List for a Training Station of an Admin. Assist.

Training Station: Time, Meetings, and Travel Management

Duties:	- Manage time - Arrange meetings for manager - Coordinate travel plans		
Tasks:	done alone	under supervision	not done
Time Management:			
- compare secretary's calendar to manager's			
- prioritize secretarial duties			
- prioritize mail, meetings, phone calls			
- delegate tasks to staff			
- screen phone calls, mail, meetings, visitors			
- anticipate and respond to customer crises			
Meetings Management:			
- obtain meeting information from manager			
- reserve conference room and equipment			
- confirm final meeting place with attendees			
- arrange accommodations for out-of-town guests			
- plan and order refreshments			
Travel management:			
- obtain travel requirements			
- select and make flight arrangements			
- select and make hotel reservations			
- arrange ground transportation			
- secure appropriate travel documents: passport, visa, etc.			
- advise staff of manager's absence and acting manager			
- process 'Request for Travel' form			
- acquire tickets and money			
- verify travel arrangements prior to departure			
- arrange meetings at destination			

BEST COPY AVAILABLE

Figure (2): A Rotation Plan for Banking Apprentices in Switzerland

Rotation Planning Within Banks: A Realistic Rotation Plan that Works at Bank Julius Baer in Zurich

First Year of Apprenticeship	**Duration**
Checks dept.	8 weeks
Money Transactions (Switzerland and International)	8 weeks
Bookkeeping dept.: -bank accounts *OR* - security deposit accounts	8 weeks
Coupons dept.	2 weeks
Registry/Archives	2 weeks
Incoming and Outgoing Mail	2 weeks
Internal Printing dept.	2 weeks
Securities Control	8 weeks
Second Year of Apprenticeship	
Stock Exchange	8 weeks
Short-Term Investments	8 weeks
Accounting dept.: - central accounting or - mutual funds accounting	8 weeks
Signature Card Control	4 weeks
Teller Services	4 weeks
Security dept.: - securities delivery or - security issue business	8 weeks
Third Year of Apprenticeship*	
Loans Dept.	10 - 20 weeks
Legal Services	10 - 20 weeks
Portfolio Management	10 - 20 weeks
Foreign Exchange Dealing	20 weeks
Swiss Options and Financial Futures Exchange (SOFFEX)	10 - 20 weeks
Sales	10 weeks

*** In the third year, the apprentice has the choice to stay in one department for 20 weeks (half a year) or two other departments for 10 weeks each. This means that not all the student learners go through all the departments in their third year.**

Figure (3): Set of evaluation forms to be completed for each student learner after every training station.

Page 1 (to be completed by supervisor)

STUDENT LEARNER/SUPERVISOR MEETING #3
SUMMARY EVALUATION

Student learner's name:______________________________
Department/Training Station:__________________________
Time period: (from)______________ (until)______________

1. Has the student learner gained a clear understanding of all phases of the duties of the station? Explain.

2. Did the student learner accomplish established job activities or goals? Were assigned tasks completed? Explain.

3. Did the student learner achieve excellence in his/her work? Comment on thoroughness, accuracy, and overall completion of job assignments.

4. Was the student learner a team player, able to gain the support of others in the group and contribute to others when necessary? Explain.

5. Describe those areas where the student learner could benefit from improvement.

6. Describe the student learner's strongest points.

7. Would it be beneficial for this student learner to take certain courses to help achieve career goals? If so, which courses? Explain.

8. Please list any additional comments or recommendations.

Page 3 (to be completed by student learner)

Student Learner's Contribution ***My Activities***

My name (student learner):____________________________
Department/Training Station: __________________________
Time frame: (from)______________(until) ______________
Year of Apprenticeship: first☐ second☐ third☐ fourth☐

Tasks and Activities:

Work load: too much☐ just right☐ too little☐
What did you like best?

What did you like less/least?

My suggestions for improvement, personal remarks:

Comments on this training station:

Date: Signature of student learner: Signature of mentor:

Page 2 (to be completed by supervisor)

Performance against SCANS-Skills

Foundation Skills	3= excellent 2= good 1=fair 0=poor				
Basic Skills	The ability to read, write, perform arithmetic and mathematical operations, listen and speak	3	2	1	0
Thinking Skills	The ability to think creatively, make decisions, solve problems, visualize, reason, and know how to learn	3	2	1	0
Personal Qualities	Displays responsibility, self-esteem, sociability, self-management, integrity and honesty	3	2	1	0
Competencies					
Resources	Effective in managing time and money to complete tasks within budget and deadline constraints, ability to organize co-workers based on personal qualities and work requirements, and to use materials and facilities effectively.	3	2	1	0
Information	Identifying and analyzing relevant information and keeping track of it in an organized method, Includes synthesizing and using a computer to manipulate information to be communicated in the most effective format.	3	2	1	0
Interpersonal	Objectively working with others as an effective member of a team, as a trainer of new co-workers, assisting customers effectively; includes taking on a leadership role to improve existing procedures to make some process better.	3	2	1	0
System	Understanding and manipulating a procedure to produce desired results; measuring and correcting, or improving the procedure or designing an alternative method.	3	2	1	0
Technology	Understanding and applying the most appropriate piece of equipment for the job, maintaining that equipment in good condition, and troubleshooting any problems for correctable solutions.	3	2	1	0
	Overall evaluation of student's performance against SCANS skills	3	2	1	0

Evaluator's comments:

Signatures:

Student Learner: Date:

Supervisor: Date:

Figure (4):

Outline of a Modular Training Program for Worksite Supervisors/Mentors/Coaches

This outline is based on the Swiss Federal 6-day seminar for Apprenticeship supervisors (Lehrmeister), which is mandatory for businesses that want to educate apprentices.

Topics of Module 1:

- Evolution of a career/life goal for students
- Career counseling -- Who does it? What does it?
- Hiring process in the world of work

Trainer: Good career counselor, and HR people

Topics of Module 2:

- Planning and realization of structured work-based learning
- Teaching and learning on the job
- Assessment/evaluation of the student learners

Trainer: Worksite learning expert

Topics of Module 3:

- Understand and work with youth between 16 and 22 years of age
- How to be a good mentor on the job
- What to do in certain situations (case management)

Trainer: A good psychologist and maybe parent

Topics of Module 4:

- Legal basics of work-based learning (OSHA, child labor laws, etc.)
- Apprenticeship basics like contract, goals, partners (BAT*, sponsor, Community College), etc.
- Your relationship with the vocational school (Comm. Coll., High school)
- The Final Exam (Graduation and Certification)

Trainers: People from BAT*, Educators, Chamber of Commerce etc.

* Bureau of Apprenticeship and Training of the US Department of Labor

DIALOGUE BETWEEN EDUCATORS AND INDUSTRY: THE LINK TO INSTITUTIONALIZATION OF TECH PREP PROGRAMS

by
Steven J. Krause
SPECAP
College of Education
Texas Tech University
Box 41071
Lubbock, TX 79409-1071
(806) 742-2329

Tech Prep is a national program which provides a structure and essential education to help young people secure their future through a six-year "seamless" plan of broad-based curriculum (both academic and technical classes) that emphasizes marketable skills relevant to the workplace. According to a fact sheet by Brumley (1994), the 25 Tech Prep area consortia across the state of Texas provide a partnership between area business, colleges, and high schools. In cooperation with one other, community colleges work with high schools and business to develop six-year plans, which start in the ninth grade and are completed at a two-year college by earning an associate degree. There is the option of continuing one's academic goals by completing a baccalaureate degree.

In a memorandum from the Texas Higher Education Coordinating Board to all Tech Prep directors, it was noted that Tech Prep stakeholders have led the way in making it possible for all students to have access to comprehensive workforce education opportunities. The memorandum stated:

> *"Tech Prep may not be funded in the same way after the current session of Congress, but it is important that partnership efforts continue their focus on comprehensive, seamless, articulated workforce education programs. The education agencies believe that continued development and implementation of Tech Prep and School-to-Work programs are vital to Texas. Although all Tech Prep programs will qualify as School-to-Work programs, not all School-to-Work programs will involve an associate degree, and not all will be in the technical areas. For this reason and others, it remains important to maintain the identity of Tech*

Prep while using the lessons learned from it in educational reform." (Butler, 1995, Personal Communication)

Two important themes emerge from this memorandum. First, as funding methods for Tech Prep programs change, in order to achieve successful institutionalization (entrenchment or permanence of a program) of Tech Prep, partnering among the stakeholders will be vitally important. Second, in order to achieve outstanding School-to-Work success, the curriculum must efficiently prepare students for the workforce. The critical factor in achieving a prosperous Tech Prep program in Texas is to create a climate of cooperation among partners that leads to close and frequent dialogue between the stakeholders. Without dialogue, the lines of communication break down, which then leads to an obsolete curriculum that loses its credibility. When this occurs, funding supporters and decision makers turn to other alternatives.

Purpose. The purpose of this article is to demonstrate how frequent and close dialogue between stakeholders is an essential component in achieving a high quality curriculum. In demonstrating the utility of dialogue, I will rely on a single case study of how one extraordinary Tech Prep program, the Advanced Petrochemical Process Technology A.A.S. Program (in Gulf Coast Tech Prep Consortium), rose to exemplary status as chosen by their peers. In studying how college programs achieve distinctiveness, Clark (1970) points out how success helps institutionalize a program. The success of the Advanced Petrochemical Process Technology Program attests to the importance of dialogue in achieving a quality curriculum that, in turn, leads to institutionalization of the program.

Background. Besides cost and availability, one of the most essential features of any product marketed is that quality be designed into it. This aspect, designing quality into a product in the initial stage of product development, rather than at the inspection stage, has been the trumpet call of the Total Quality Management movement in our country. Likewise, we have seen many colleges and schools adopt similar themes in coping with change while developing means of improving institutional performance (Massy & Meyerson, 1994). To a two-year community college, improvement can be measured by many means, such as reduction in the cost of education per student, student growth rate by program, or by increases in total enrollment. As for educational objectives, improvement can be realized through better instructional methods and an effective curriculum. For the purpose of this article, the primary focus is on improving curriculum through dialogue.

While most educators would agree that improving institutional performance can be realized through a quality curriculum, many are unfamiliar as to what steps to take or they lack formal training on building quality into the curriculum. In order to produce top graduates who can immediately enter the work force, the most fundamental component, in my belief, is a curriculum that reflects the needs and requirements of targeted careers. In other words, to what degree is the curriculum driven by the proficiency requirements of a student's eventual job? Perhaps the most important aspect of developing any quality curriculum -- whether trained in curriculum development or not -- is the willingness of the curriculum developer to partner with the experts in the field, namely, their business and corporate counterparts, who in turn can serve as valuable subject advisors. Thus, "dialogue" between the two-year colleges and key stakeholders representing business and industry is essential to achieving a desired level of quality that translates into a high rate of job placement for students completing a Tech Prep program at a two-year college.

The importance of stakeholder involvement is exemplified by research results conducted by the Strategic Planning, Evaluation of Curriculum, Assessment of Performance Group (SPECAP) at Texas Tech University (Cooper, Hensley, and Opp, 1995). Several stakeholder groups have been identified at the Tech Prep consortium level who are involved with performance assessment. The study revealed the following groups are represented in assessment activities:

- consortium director - 58.4 percent
- business representatives - 43.2 percent
- government representatives - 40.9 percent
- community college faculty - 40.3 percent
- community college administrators - 38.3 percent
- high school administrators - 35.6 percent

The high involvement by these groups indicates the importance they place on improving performance and the level of dialogue that must take place to enhance the curriculum.

Not only did the SPECAP study reveal the importance of involvement by stakeholders, but the American Association of Community Colleges (AACC) (1996), which has sponsored annual competitions for the Parnell Tech Prep Awards, has set its own criteria for rating Tech Prep programs. The AACC emphasizes the need for Tech Prep programs to be developed and measured in terms of partnerships, curriculum, marketing/communications, institutional commitment, guidance and student support, and evaluation. As for partnerships, top programs are marked by

> *"involvement of local business partnerships in planning a coordinated curriculum, including evidence of local support in both participation and resources."*

With respect to the curriculum, excellence is evident when emphasis is placed on "a coordinated curriculum", where outcomes are marked by enhanced skills. A well-coordinated curriculum can only be achieved when dialogue concerning the curriculum is characterized by full participation, involvement, and coordination amongst the stakeholders.

The key to any curriculum development process is the relationship between the curriculum developer and the subject matter expert. Curriculum developers are often teachers or administrators who have been assigned the task of designing a curriculum with the help of experts from the field. Experts from the field, generally, are in the best position to know the knowledge, skill, and attitude requirements of a particular task or job. Thus, subject matter experts are usually individuals considered experts in their field. The DACUM (Developing a Curriculum) process helps to facilitate a working relationship between the curriculum developer and subject matter experts, and has been referred to as "a competency-based curriculum tool" (Norton, 1990). Using this curriculum development process, a job analysis is conducted jointly by the developer and subject matter expert to examine and identify all of the tasks and attributes required for competency in a particular job.

A feature which makes the DACUM process effective is the emphasis placed on coordinated gathering of information centered about a particular job, through the formation of a DACUM committee from the occupational area. Norton explains the role of the committee in the following manner:

> "*Guided by the facilitator, the DACUM committee identifies general areas of job responsibility called duties, pinpoints specific tasks performed in connection with each duty, reviews and refines the task and duty statements, sequences them, and identifies entry level tasks.*" (Norton, 1990)

When using the DACUM process, communication in the form of close and frequent dialogue must occur during the early curriculum development stages between the DACUM committee (subject matter experts) and educators who serve in the role of curriculum developers. The subject matter expert is of extreme importance to the DACUM model. Likewise, the case study on the Advanced Petrochemical Process Technology program reveals the importance that representatives from industry serve in fulfilling the role of subject matter experts. Not only is their expertise an essential component in building an effective curriculum, but so, too, is a teamwork approach that is needed in order to create a working climate characterized by frequent and close dialogue.

Methodology. At the time this monograph was produced, the SPECAP Group was conducting a comprehensive analysis of the effective

Tech Prep policies and practices in selected career fields and the impact of Tech Prep on Texas education. A major objective of the study was to identify exemplary programs in the career pathways of allied health, business, and engineering technology, so that others may emulate them. Data collection for the SPECAP project consisted of document analysis, site visits, questionnaires, and telephone interviews.

For the purpose of developing this case study, the primary sources of data came from SPECAP data collection efforts which consisted of documents obtained through the Texas Higher Education Coordinating Board on each of the approved Tech Prep programs offered in the state of Texas, telephone interviews, and a formal report presented at the 1996 Texas State Tech Prep Conference entitled "Process Technology A.A.S. Degree Program: Partnering With Business, Industry, and Labor" (Kukuk and Foster, 1996).

The case study approach is used in this article to convey the success story of the Advanced Petrochemical Process Technology A.A.S. Degree Program. Case studies are of sufficient narrative detail covering a specific slice of life to enable the reader to transfer themselves into the environment described by the case study. This transfer function is based upon the reader's ability to vicariously experience what is happening in the case study (Lincoln and Guba, 1985). Thus, examination of this case study on the Advanced Petrochemical Process Technology program may aid other program developers in creating their own effective curriculum.

As I mentioned earlier, the Process Technology A.A.S. Degree Program met the criteria for exemplary status by a vote of peers. The Tech Prep directors were asked to select which consortia had programs that they considered exemplary in the state. The directors indicated by an overwhelming vote of confidence that the Gulf Coast Consortium had several programs that were noteworthy. One of these programs was the Process Technology A.A.S. Degree Program. The selection of this program as a case study for this article was based on its success and extensive dialogue amongst the stakeholders. As an exemplary program, its selection was also influenced by its adherence to the Instructional Systems Development model (Department of the Air Force, 1986) and its reliance on the DACUM process. Some of the literature refers to ISD as Instructional System Development, but for the remainder of this article, ISD refers to Instructional System Design, in order to be consistent with how the program developers associated with the Gulf Coast Consortium use this terminology.

The Process Technology A.A.S. Degree Program

Program Description. The Process Technology A.A.S. Degree Program is a Tech Prep-approved course of instruction offered by the

College of the Mainland located in Texas City, Texas. According to the program description (College of the Mainland, 1994), the purpose of the program is to prepare students for advanced technological careers in the area of process operations at local petrochemical and refining industries. The multiple-entry/multiple-exit program provides students with both academic and technical competencies required by the rapidly changing demands of the industry.

The program of instruction serves the Texas City industrial area, represented by eight major petrochemical and refining facilities employing approximately 5,800 people, 1,800 of whom are petrochemical operators. The need for this type of occupational training is clearly evident (College of the Mainland, 1994). Process Technicians constitute the single largest skills area due to the shift work nature of the position. Based on a survey (1994) of the Texas City facilities, there will be a need for approximately 200 new operators over the next five years. Additionally, for a large number of operations employees, their upgrade training results in added demand for backfill positions. The Houston Ship Channel and Bayport have rather large attrition rates and a need for this kind of high-technology degree program.

Program Development. The first proposal for a local program to train process operators was written in 1993 when a group of training consultants representing the Texas City Petrochemical Industry approached the College of the Mainland. Only two Process Technology programs existed -- one at Brazosport College and one at Lamar Technical College; neither of these schools could handle the demand for degreed process operators. Once the need for additional advanced technology process operators became apparent, the College of the Mainland sought program approval from the Coordinating Board, with subsequent implementation of the program on August 29th of that same year.

The curriculum development model of choice was the Instructional Systems Development (ISD) model (Kukuk and Foster, 1996) frequently used within the two-year college community (Pickle, 1996, Personal Communication). The DACUM process was relied upon in the initial stages of curriculum design. The principles of the ISD model have evolved over the last 30 years as a tool for applying behavioral learning principles to classroom instruction. "It began with models of step-by-step procedures designed to enable anyone to develop instruction and evolved to sophisticated models concerned with complex technological, as well as cognitive and affective issues, that require experienced instructional design experts to sort out." (Dept. of the Air Force, 1993, p.5). The ISD model consists of the following phases: a) analysis/needs assessment, b) design, c) development, d) implementation, and e) evaluation. The last step is an integral feature that can be applied in the early stages in order to maintain continued improvement and provide feedback on quality issues.

Results of Telephone Interviews. A large number of chemical companies met. Everyone came to the table with various ideas. When interviewees were asked "Who was involved in reviewing your program curriculum?" one respondent mentioned how "everyone focused toward a common goal to meet everyone's expectation of the curriculum." However, it was a struggle to gain cooperation amongst industry representatives and community college educators before the group even agreed to a shared goal. Reaching that point in gaining cooperation of the group characterized by a single mindset was a struggle. According to one interviewee when asked "How frequently did your group meet to design the curriculum?" The response was,

> *"In the first 18 months, the standing advisory committee met twice a month. The committee was comprised of ten people representing seven companies that do petrochemical processing. The ad hoc groups which formed into sub-committees met weekly. The smaller ad hoc groups were very active in the beginning. A lot of time was spent -- as much as 100 hours were logged at the beginning. Most of the time it was a pleasant experience, but sometimes our meetings broke down. It took 2 to 3 months to establish a common goal among the industrial representatives. It took them that long to figure out that they were on the same side. Once they learned to work together for a common goal, it's made a big difference in how they now work together."*

This same observation was evidenced by yet other participants in the development stage who indicated that when developing a mission statement and clarifying goals, these activities became tedious tasks. Because of the various backgrounds and strong ties to one's own company, these two areas required many hours to sort out. Eventually, through much deliberation, the group agreed upon a single objective. The objective was to develop a common target with a particular mindset that emphasized student preparation. The main theme that emerged from early dialogue was "preparing people for peak performance." In reflecting on how the Processing Technology Advisory Committee (PTAC) finally got rolling, Kukuk and Foster (1996) indicate how the group's attitude was influenced by a pre-design vision that restated Robert F. Kennedy's famous quote in the following manner: "Some people see things as they are and say WHY. We envisioned things that never were and said WHY NOT."

The above comments indicate that meeting frequently was of particular importance to achieving success, especially in the early stages of setting program mission statements and program goals. Equally important was the closeness in which the committees worked together to set instructional goals for each course. According to Kukuk and Foster (1996), the needs analysis phase of the curriculum development effort consisted of these four elements:

- formation of a process technology advisory committee
- survey of the local industry (attrition rates)
- completion of an operator Job Map (results of the DACUM process)
- establishment of program benchmarks

The needs analysis phase required 18 months of effort, but once completed, PTAC continued with the remaining phases of the Instructional System Design model -- design, development, implementation, and evaluation.

When asked "What curriculum development options did you consider?" one respondent indicated,

> *"We also visited other established programs to learn from them. We visited Lambton College in Ontario, Canada, and Lamar University and Brazosport College in Texas. This gave us a sense of direction."*

Another comment demonstrates how intense the dialogue must be in order to achieve a systematic means to designing the courseware. The interviewee indicated that since the program would be too challenging for just one company within the industry to be responsible for identifying needs and conducting task analysis, representatives from all the companies would be much more productive.

> *"We did a DACUM in order to produce a job map. This was extremely important. We brought in experienced operators to serve as experts in order to identify job knowledge and skills required to do the job."*

The seven operators on the panel had a total of over 130 years of experience.

In putting the curriculum together, this same interviewee stated that when

> *"designing curriculum with job maps, we included traits, skills, attitudes, abilities, and even future trends, to ensure this program would grow -- even the issue of diversity came up as 51 percent of our students are minority or female."*

Caution must be observed at this stage so that dialogue is not limited, esoteric, or lacking focus, but is meaningful, specific, and precise for all users.

Although the advisory committee toiled to get there, a team spirit eventually swept through all of the members, which improved their ability to communicate effectively with each other. Throughout the curriculum development effort, a central theme persisted -- the courseware would be "industry-driven." One interviewee indicated,

> *"This is the first time in the history of Texas City that all major companies came together to create something for all to use."*

Other key phrases emerged as well, showing the importance that teamwork had on producing a curriculum which reflected industry requirements:

> *"Once they learned to work together for a common goal, it's made a big difference in how they now work together."*
>
> *"There was heavy union input as well. They had comments that communicated that they wanted a well trained work force and wanted to be behind the movement to get it."*

In order to better elucidate the teamwork factor, one community college administrator noted with great satisfaction what he referred to as the "Amoco Link." The relationship between the college and this company had been nurtured and highly valued: Amoco had provided extensive time away from the company for an individual to serve as the chair of the committee. The Amoco representative did an excellent job of promoting a team concept throughout the development stage of the Process Technology curriculum. He continually balanced his company's business needs with the other Texas City plants' business needs to ensure the success of the industry-driven program.

Discussion. The dialogue that ensued over time by the stakeholders associated with the Advanced Petrochemical Processing program was characterized by:

- good listening skills (as exemplified by learning to work with each other)
- goal setting (as exemplified by a single-minded approach)
- an industry-driven perspective (dialogue associated with an industry needs analysis and the DACUM process)
- team-work (cooperative spirit which fostered open communication and commitment)

Using the case study approach on the Advanced Petrochemical Technology program has yielded several important lessons worth mentioning. First, when curriculum developers set out to build courseware for a particular program, the developer alone may not possess all of the knowledge, skills, or attitudes needed to build the program, let alone a single course. It becomes paramount then to seek information from experts in the field. For example, as the director of operations for curriculum development of B-1B flight training courseware, I was once tasked to build a course on B-1B flight formation training. Although a qualified instructor navigator in the B-1B bomber, I possessed only basic knowledge of performance requirements of flying in formation; however, as a highly experienced curriculum developer, I knew how to supplement course development with information gained from subject matter experts. Close dialogue maintained with a qualified instructor pilot led me through the details. Because I sought the proper expertise from outside my office, I was able to ensure that the course was accurate, properly sequenced, meaningful, and effective. In the same way, College of the Mainland sought expertise that could only be obtained with local industry. Their efforts paid off. From industry's perspective, the curriculum is accurate and current. Thus, the courseware has achieved a sense of credibility.

Second, an effective curriculum provides students with tools they need in order to step right into a job after they graduate from their college. One member of the PTAC, also a plant manager, claimed that employer evaluations are a source of valuable feedback on the effectiveness of the Tech Prep program. He stated, "with respect to program job placement, the students are stolen right out of the program because they are so sought after." The curriculum has achieved credibility through its effectiveness.

Third, when a student does step into a position based upon his or her technical training, has the training been good enough to reduce or eliminate additional business-sponsored training? One interviewee indicated that Amoco-specific introductory training requires 28 days, but, after attending the programs, it is reduced to five days per employee. In terms of expense, a math model used by the industry representatives and quoted by College of the Mainland shows that the cost to train an operator has been significantly reduced from approximately $100,000 for the first year of employment by completing the Petrochemical Processing Technology program. When a program can produce well-qualified graduates, while at the same time conferring benefits to industry by reducing industry-sponsored training, industry's reliance on the program grows concurrently with the program's reputation of success.

The fourth lesson involves industry trust of the curriculum, which later translates into funding support. If the curriculum can achieve all that has been previously stated, then students, industry, and the Tech Prep program stand to be the big winners. New relationships grow out of Tech Prep programs that successfully help students go directly from school to work. Industry grows to further trust and depend upon the work of the local community college and as a result, are inclined to support the community college any way it can. After all, it is in their best interest to do so. One interviewee explained that it is important to encourage industry to pay back the college in some meaningful form when the college program saves industry time and dollars. "This is important if we want to establish a new trend in developing funding sources for the future."

Conclusion. Any questions regarding the institutionalization of this program (indicators that the program has achieved a significant level of permanence) can be put to rest due to the program's growth rate, the 100 percent job placement rate, and a high level of employer satisfaction. These kinds of results translate into opportunity for future students to achieve the training that leads to successful employment. For some graduates, there is also the potential opportunity to continue in a four-year college or university. To reach a level of program entrenchment that is now enjoyed by the stakeholders in Gulf Coast Consortium, dialogue has proven to be the essential ingredient. As one interviewee stressed,

> *"The key to success has been that dialogue has been essential. Some institutions are sadly mistaken to think that they can do it alone. Technology moves too quickly."*

References

American Association of Community Colleges 1996. *Request For Proposals: 1996 Tech Prep Awards*. Washington, DC.

Brumley, B. 1994. *Tech Prep - An Overview*. Big Springs, TX: Howard College.

College of the Mainland 1994. *Process Technology Application Manual*. Austin, TX: Texas Higher Education Coordinating Board.

Cooper, P. A., O. D. Hensley. and R. Opp. 1995. *The Tech Prep Handbook: Effective Tech Prep Policies and Practices*. Lubbock, TX: The SPECAP Group, Texas Tech University.

Department of the Air Force 1986. *Instructional System Development* (Air Force Manual 50-2). Washington, DC: Headquarters, USAF.

Department of the Air Force 1993. *Information For Designers Of Instructional Systems* (Air Force Handbook 36-2235). Washington, DC: Headquarters, USAF.

Kukuk, M., & C. W. Foster. 1996. *Process Technology A.A.S. Degree Program: Partnering With Business, Industry, And Labor*. Unpublished report. Texas State Tech Prep Conference, Austin Texas.

Lincoln, Y. S. & E. G. Guba. 1985. *Naturalistic Inquiry*. Newbury Park, CA: Sage.

Massy, W. F. & J. W. Meyerson. 1994. *Measuring Institutional Performance In Higher Education*. Princeton, NJ: Peterson's Guides.

Norton, R. E. 1990. *DACUM: A Competency Based Curriculum Tool*. Columbus, OH: Center on Education and Training for Employment.

EDUCATION, TECHNOLOGY AND THE WORLD OF WORK: CREATING THE FUTURE

by
Charles D. Schmitz
Dean, School of Education
University of Missouri at St. Louis
8001 Natural Bridge Road
St. Louis, MO 63121
(314) 516-5109
and
Elizabeth A. Schmitz
Director of Assessment, Technology, & Planning
Clayton ISD
7530 Maryland Ave.
Clayton, MO 63105
(314) 862-7659

The dramatic changes technology has brought to the workplace have enormous implications for schools. Secondary education must take on new meaning and direction to meet the needs of a changing, technologically oriented society. Educators can no longer afford to prepare students in isolation from the world of work. However, there is a solution. The innovative uses of telecommunication and multimedia technologies to simultaneously bring the world of work to schools and teacher education programs offer much promise for educational reform and renewal.

Today, the majority of eighteen-year-old students are not pursuing university degrees; instead, they are entering the world of work. These students have been called the "neglected majority" (Parnell, 1995) because most secondary school programs teach to those students who will further their academic pursuits rather than promptly enter the world of work. The problem has been that most educators have *never* been a part of the world of business and industry. Their entire experiential understanding is rooted in the world of education and classrooms. Now, these same educators face the enormous challenge of preparing students to enter a rapidly changing, technologically driven world of work.

Twenty to thirty years ago, schools were able to provide students with the skills they needed to live and work. However, as Henry Kepner, an education professor at the University of Wisconsin asserts, this is no longer

228

true in the Information Age. Kepner further suggests that while American schools have prioritized the purchase of technical equipment -- installing an estimated 5.8 million computers, or about one computer for every nine students, by the spring of 1995 -- "the computer-learning revolution really hasn't happened."

The Role of Technology. With the digital age now upon us, no educational reform movement, especially Tech Prep, can progress without a strong reliance on technology. As Nicholas Negroponte says in *Being Digital* (1995, p.6), "Computing is not about computers any more. It is about living." With this in mind, one fact becomes crystal clear -- the importance of technology to school and teacher education reform cannot be overemphasized. Schools and teacher education programs must be the first places innovative technology uses are implemented. Such has typically not been the case.

Unfortunately, studies indicate that the majority of our nation's students are not receiving the preparation they need to successfully compete in the modern job market. Although many schools are equipped with computers and other technologies, a surprising number of teachers struggle to effectively integrate technology into the curricula. In the meantime, students lose valuable time in their preparation for the world they will soon enter.

The innovative uses of telecommunication and multimedia technologies to simultaneously bring the world of work to schools and teacher education programs offer much promise in correcting this problem. However, making this happen takes new types of collaborative relationships with uniquely different partners than schools of education and K-12 schools are accustomed to working with. The Tech Prep Consortia of Texas are leading ISDs, colleges, and businesses developing these new types of collaborative relationships.

What Research Indicates About Technology in Classrooms Today. In the past twenty years, researchers have extensively studied the effects of technology in the classroom. Research findings on effective applications remain inconclusive, however, because technology is expected to play a variety of roles in education. Much of the "research" on new technologies uses "old" assumptions. Hence, mixed research results. Before researchers find solid evidence of the effectiveness of educational technology, they must agree upon the purposes it best serves. While technology can dramatically enhance teaching and learning, it cannot fill needs for which it was not designed; it cannot, in and of itself, transform teaching or learning. Rather, educational technology should serve as a tool to facilitate higher-order thinking skills, problem-solving capabilities, and an interest in learning among students. Educators who have experienced success with technology suggest that effective integration of technology requires users to exercise creativity and reasoning in conjunction with academic skills.

Rather than requiring of students higher-order thinking and problem-solving skills, education's most widely used technical application involves students in rudimentary "kill and drill skills." For a variety of reasons, studies indicate that computer-assisted instruction is not preferable to teacher-led whole-group instruction, does not allow students to exercise creativity and problem-solving skills, and fails to address the learning needs of all students. A number of technological innovations, however, show promise as more effective means to supplement the twenty-first-century classroom. These innovations include distance learning, which involves the transmission of quality communications and experiences to students at a variety of locations -- whether they be in close proximity to one another or around the world. Of the configurations of technology through which distance learning can occur, two-way video and audio telecommunication allows both students and teachers to see and hear one another and to participate in demonstrations, experiments, and virtual experiences.

WORKTECH: Work-Based Learning Through Telecommunications and Multimedia Technologies. WORKTECH collaboration has been developed initially between the Center for Occupational Research and Development (CORD), several schools of education, and several high schools across America to develop methods of delivering work-based learning through telecommunication and multimedia technologies. Using two-way video and audio technology as the mechanism, this collaboration brings worksite learning opportunities to inner-city classrooms where students have not typically had access to the workplace.

As these schools have been connected to CORD, several schools of education, and business and industry workplaces, they have formed the hub of a sophisticated telecommunication and multimedia distance learning network. Ongoing interactive two-way video and audio telecommunication allows for the planning of outcomes, activities, and methodologies -- learning from each other as the relationships develop. With interactive connectivity between these collaborating partners, opportunities have been provided for the exchange of information, real-time visual images, and real-world experiences.

In addition, pre-service and in-service teachers have had the opportunity to learn about the worksite. The simultaneous renewal of schools and educator preparation programs (Goodlad, 1994) can be effective only if they are actively connected to the world of work. As society places more demands on those entering the workplace, it is imperative that both educators and students possess first-hand knowledge of the expectations of this rapidly changing, technological workplace. The underlying skills needed to meet these expectations are mapped out in the Secretary's Commission on Achieving Necessary Skills (SCANS) Report of the U.S. Department of Labor. Contextual connections can be made between classroom academic pursuits and the skills needed to be successful in the modern workplace.

To meet these necessary skills, collaboration efforts focus on the improvement of mathematics and science instruction by bringing related worksite experiences and scientific knowledge into the classrooms and educator preparation programs. In addition, it allows for demonstration of the best teaching practices to be communicated via two-way video and audio telecommunication.

Professional Development and the Role of the Teacher. One of the key findings of the study conducted by the Office of Technology Assessment (OTA, 1995, p.2) is that,

> *"Technology can be a valuable resource for improving teacher education. It can bring models of the best teaching live from the classroom into the colleges of education, or provide video case studies of teaching styles and approaches. It can forge stronger connections among student teachers, mentor teachers in the field, and university faculty."*

Even though most educators realize the importance of technology in the classroom, they have not been able to incorporate it into the curricula. A number of teachers have indicated many reasons for the difficulty of integrating technology, reasons that command attention from administrators and policy-makers. In many cases, schools purchase complex equipment for classroom use without providing teachers the professional development time so critically needed to learn equipment operations and applications. In other situations, educators are concerned that integrating technology will upset established, accepted curricula. Still, others fear technology will minimize the role of the teacher in the classroom and will deprive teachers of student contact and the sense of accomplishment that can result from a career in education.

If our country is to successfully integrate technology into education, we must address the needs and concerns of those in the classroom -- our nation's teachers. This effort requires increased open communication among all of education's key players. Administrators and educators must collaborate with other educators, and consult available research, to determine technologies suitable for each classroom. These efforts will aid teachers in integrating technology into curricula, which will bring a wider range of resources into the classroom, motivate learners, provide teachers with effective new tools, accommodate individual student learning needs, and positively enhance, rather than minimize, the role of the teacher -- from the transmitter of knowledge to facilitator in the learning process.

The successful integration of worksite experiences into the curricula using two-way video and audio technology will depend upon teachers accepting this change from the role of teacher to facilitator. As they begin to embrace the role of facilitator, teachers will begin to look toward technology as one of the solutions to actively engage students in the learning process.

Even though two-way video and audio technology has great potential as a solution to actively engage students in the learning process, two of the greatest obstacles to its effective use for work-based learning are the lack of established methodologies for classroom implementation and teacher access to professional development opportunities through which they can explore the uses of this new technology. Interestingly enough, the technology itself has the potential to provide the solution to overcome these major obstacles. Two-way video and audio technology allows teachers to share ideas with each other in real time. Giving teachers the connectivity to share new technology successes has been an extremely important benefit of the telecommunication network. A similar conclusion was reached in the OTA report (1995, p.8) when it stated,

> *"Making the connection between technology and teachers -- helping the 2.8 million teachers in public and private kindergarten through twelfth grade (K-12) schools effectively incorporate technology into the teaching and learning process -- is one of the most important steps the nation can take to make the most of past and continuing investments in educational technology."*

It is critical that we develop the most effective methods for implementing new technologies before placing those technologies into classrooms with the unrealistic expectation that teachers will just "figure it out" in isolation or at one-shot, in-service training workshops. For decades, it has been the teachers who have had to develop the methods for using new technologies, while trying to maintain their everyday teaching workload. By working collaboratively and sharing knowledge, this unique team -- CORD, schools of education, and businesses and industries of the region -- use this new technology while incorporating work-based learning experiences.

This approach can also help address two other major problems frequently identified in the public schools: *isolation and irrelevance*. The OTA report (1995, p.50, 60) suggests that

> ". . . new telecommunications options, can transcend the walls of isolation that plague the profession. . . [and] *can connect students and teachers -- sometimes instantaneously and simultaneously -- to poets or politicians, musicians or religious leaders, university professors or researchers on a national super computer, or other students down the block or on the other side of the world."*

Also among the key findings of the OTA report is that technology helps establish a link between the classroom and the "real" world and can "extend the environment" for students;

> *"We're more keenly aware of a world outside the classroom, in the sense of being able to reach out to information resources and not operate in a vacuum."*

The future is dependent upon the success of schools in preparing students for life in general and the world of work, specifically. The changing world will not wait for educators to move slowly into this arena.

Conclusions. Why is this movement so vital to the country's future? A dual educational system exists in much of America today -- one for the advantaged, one for the disadvantaged. This is most evident in the area of technology and the workplace. Suburban schools can give their students work-based experiences at progressive businesses, while most rural and inner-city schools cannot.

During earlier times, students watched adults work and learned workplace skills as part of daily life. Many of today's students, however, are isolated from potential employers for many reasons including distance. Females and minorities often exclude themselves from careers because of a limited perception and awareness of the fields available to them; they need to see role models of their own gender or race in these careers. Teachers and counselors are limited in their ability to expose such students to various careers. Providing meaningful work-based learning experiences involves solving difficulties such as providing transportation to the worksite, insurance coverage, and safety training.

The preparation of our teachers and young people is too important to leave in the hands of schools working alone and in isolation. Only through collaborative efforts like the WORKTECH project can the reform movement be truly effective in preparing the nation's educators to build bridges between the worlds of school and work.

References

Bulkeley, W. 1993. "Computers failing as teaching aids." In Cannings, T. R. and Finkel, L. eds. *The Technology Age Classroom,* Wilsonville, Oregon: Franklin, Beedle and Associates.

Goodlad, J.L. 1994. *Educational Renewal.* San Francisco: Josey Bass.

Negroponte, N. 1995. *Being Digital.* New York: Alfred A. Knopf.

Parnell, D. 1995. *Why Do I Have To Learn This?* Waco, TX: CORD Communications, Inc.

U.S. Congress, Office of Technology Assessment 1995. *Teachers and Technology: Making the Connection, OTA-EHR-616.* Washington, DC: U.S. Government Printing Office.

ABOUT THE AUTHORS

Denise M. Bloomquist holds a BGS from the University of Iowa, a M.Div. and a Th.M. from Texas Christian University, and a MPA from Angelo State University. She has been District Manager for Representative Robert Junell for the past seven years, and is the coordinator for the Summer Jobs for Youth program. In addition to her work for Rep. Junell, she is minister to a church, an instructor of American and State Government at a local junior college, and a self-employed grant writer.

Carrie Hughes Brown, Ph.D., is currently the director of the Tech Prep Leadership and Evaluation Project for the State of Texas. Last year she served as director of the state's Tech Prep/School to Work Initiative Management Project. Prior to that, she served as director of the Deep East Texas Tech Prep Consortium and part-time science faculty at Angelina College in Lufkin.

From 1988 until 1993 she worked as Program Director in the Community and Technical Colleges Division of the Texas Higher Education Coordinating Board where she directed the statewide implementation of the Tech Prep initiative.

Dr. Brown has served as a high school teacher, community college department head, and university lecturer. Her private sector experience includes eight years as a medical technologist and work as an electrical design consultant for an Austin-based engineering firm.

This article has been excerpted from *Tech Prep ☆ Texas -- Education that Works STATUS REPORT April 1996: A Snap-Shot of the Impact of the Tech-Prep Initiative in the Governor's 24 Planning Regions: STATE SUMMARY*. This article is not copyrighted and may be reproduced entirely or in part. Dr. Brown would appreciate credit for the material used and a copy of the reprint.

Pat Bubb has worked in education for 16 years: six years as a teacher and ten years as an administrator. Before that, she worked as a legal secretary and then as a legal assistant, spending 12 years working with and for attorneys. Bubb has a Bachelor of Arts in English and history and has participated in many innovative projects, including consulting as a trainer for industry.

Pamela A. Cooper, Ed.D., was an adjunct professor in the Higher Education Program, co-investigator for SPECAP, and Director of Library

Development at Texas Tech University. Dr. Cooper was recognized as one of the most aggressive pioneers in developing new techniques for analyzing faculty productivity. Her sustained work in developing the Special Library Collections is nationally recognized. Her untimely death in the fall of 1995 left a huge void in our personal and professional lives. Although she was not present to see the completion of this monograph, her early contributions and indomitable spirit greatly aided in its development.

John DeLeon, Ph.D., is an assistant professor in the Department of Technology at Southwest Texas State University. His teaching assignments include industrial safety, CADD, quality assurance, and industrial ecology. He actively recruits for the department and is credited with spearheading transfer initiatives with regional community colleges. He intends to expands the transfer equivalency guides to include a 2+2+2 functional degree outline. His research interests include the application of technology education to workforce literacy, and developing a curriculum model for the integration of CADD and rapid-prototyping.

Sarah (Sally) Duke, R.N., as a graduate of St. Paul School of Nursing, has worked in multiple departments within hospitals and for a major insurance company as a medical advisor to the vice-president. Prior to becoming a HST instructor in 1990, she spent 15 years at the Tarrant County Juvenile Detention Center as clinic manager. She was a member of the Tarrant County Sex Abuse Advisory Council for eight years and on the AIDS Coordinating Council of Tarrant Council for two years. As a HST instructor at Richland High School, she is an active member of the Tech Prep and ASTD Committees.

Robert A. Egloff was born, attended school, and did an apprenticeship in banking in Switzerland. He also studied in England and the United States. He holds a Bachelors Degree in Business Administration, a Masters Degree in Business Education, and a Teaching License for Business Subjects. In various assignments with Union Bank of Switzerland and a large Swiss department store company, he was responsible for the education of a variety of apprentices in business administration, sales, retail, food preparation, decorating, and travel. This included the design and implementation of the training program; the assessment, hiring, and career counseling, as well as the practical and theoretical training. During the last ten years in Switzerland, he has been self-employed as an Apprenticeship Consultant, primarily working with Zurich banks. He has also been a vocational college teacher, trained workplace mentors, and built, owned, and operated his own corporation -- a tutoring school for business apprentices in Zurich. He and his family moved to Austin, Texas, in February, 1995, where he and his wife are now working with the Capital Area Training Foundation to help implement an improved School-to-Work system in America.

Geralyn Elmore is a Career Consultant Specialist working under a School-to-Work grant received by the Capital Area Training Foundation in October, 1994. The Capital Area Training Foundation is a non-profit industry lead organization in the Austin area chartered to provide a synergistic focal point between industry, educators, students, parents and the public to build a School-to-Work transition system through apprenticeships, internships, learning rich summer jobs, Tech Prep, and other similar programs. Elmore is working with three school districts within the Capital Region in building this School-to-Work system. Her activities are focused on implementing a Comprehensive Career Guidance System K-12, integration of career education and activities K-12, and working with students in career planning and preparation beyond high school as well as internship placement.

She has been in Career and Technology Education (Food Production Management Services) for 16 years and in industry in Food Service Management. Her last two years have been spent working with the Capital Area Training Foundation implementing School-to-Work.

Richard C. Froeschle currently serves as the Executive Director of the State Occupational Information Coordinating Committee, informally known as the SOICC. He has served as director since May 1990 and previously served as a labor market economist at both the SOICC and the Texas Department of Community Affairs with the JTPA program.

Mr. Froeschle has a Bachelors Degree in Economics from the University of Texas at Austin and Masters Degree in Manpower and Industrial Relations from the University of North Texas. His professional specialties and interests are in the fields of regional economic analysis and the development and interpretation of labor market information; both of which have occupied his career for the past 18 years.

Sharon Knotts Green, Ph.D., is the External Education Manager for Motorola Semiconductor Products Sector in Austin, Texas. Her leadership in creating and implementing the company's K-12 workforce development strategy has resulted in Motorola receiving numerous business and education partnership awards. She is a past chair of the Greater Austin Chamber of Commerce's School-to-Work Transition Committee, the Mayor's Task Force on Youth Apprenticeships and Career Pathways, and

Texas Alliance for Minorities in Engineering. She has also participated in a European study tour of youth apprenticeship systems. In recognition of her advocacy for work-based learning experiences for youth and educators, she received Austin Adopt-A-School's first ever School-to-Work Transition Award.

Oliver D. Hensley, Ph.D., is a professor of Education at Texas Tech University and principal investigator for SPECAP, a Tech Prep supplemental project. Dr. Hensley was responsible for assessing Tech Prep consortium strategic plans and making site visits to audit the performance associated with the goals of those plans. Dr. Hensley has been a member of the Higher Education Program at Tech for more than a decade. He is editor for *The Journal for Epistecybernetics*, and several research monographs related to research administration. He has an international reputation for developing strategic planning in institutions of higher education. His work (and his students' work) in structure of knowledge systems advances a new way of thinking about making education more efficient and effective.

Pamela Hull is a Curriculum Development Coordinator in the Instructional Design Division at Richland College in Dallas. She served as Grant Coordinator for the Richland Skills Standards and Certification Project 1995-96. While also serving as Adjunct Faculty in Office Technology for Collin County Community College in Plano, Pam is President of District 10 of Texas Business Education Association for 1996-97. A member of Delta Pi Epsilon, Texas Junior College Teacher's Association and National Business Education Association, Pam holds a Masters of Education from the University of North Texas.

Casanda (Cassy) Key, Ph.D., has been involved in Tech Prep activities at the national, state, and local level for the past ten years and published the nation's first related dissertation, *Building Tech Prep Systems Geared for the 21st Century*, in 1991 (University of Texas, Austin). Her 31 years of work experience includes seven years in newspaper reporting and other writing; 12 years of teaching at the high school, community college, and university levels; and five years as Senior Research Associate for the Center for Occupational Research and Development. She serves on the Executive Board for the Texas Association of College Technical Administrators. A long-time member of the Program Improvement Committee and the Student Services Advisory Board for the National Center for Research in Vocational Education, her most recent related experience includes co-teaching a workforce systems graduate course for North Carolina State University in France, Germany, Belgium, and Great

Britain via a Kellogg grant. This article first appeared in 1994 in *A Handbook on the Community College in America* (Greenwood Press, edited by Dr. George Baker), from whom permission was granted to republish here.

Steven J. Krause is a former USAF flight instructor, flight school administrator, and curriculum developer. He is currently a doctoral student and research assistant in the Higher Education Program at Texas Tech University.

Krause's article is dedicated to James E. Mahin, his father-in-law, who passed away October 1995. Mr. Mahin was a key figure in School to Work programs in Oregon, leading the way in the Heating and Air Conditioning field. Long conversations regarding training and education for preparing young people for vocational work were the inspiration for this article.

Several people have helped in the preparation of this article. Bill Raley (College of the Mainland), Mike Kukuk (Sterling Chemicals), Dennis Link (AMOCO Chemicals), and Kathy Williams Foster (Marathon Oil) from the Gulf Coast Consortium contributed their time as consulting editors. Their corrections and comments helped achieve an accurate account of the Advanced Petrochemical Process Technology A.A.S. Program.

Cynthia Lackey holds a Bachelors in Education and a Masters of Education with a reading specialty from Angelo State University, and has worked for two years as a consultant to the program. She was recently named the Education Coordinator for the Concho Valley School to Careers/Tech Prep, and previously worked as an elementary school teacher in the San Angelo and Ector County school districts.

Janette Lawlis, after retiring from the Texas Education Agency, became a Career Counselor/Coordinator for Seguin ISD. When the Director of Career and Technology left the district in October, 1994, she was asked to perform his duties and responsibilities. Since that time, Seguin ISD has developed many partnerships, received tremendous support from the businesses and industries in Guadalupe County, and provided many opportunities for the students and adults in the area. These partnerships have enabled them to leverage funds and "stretch" the educational dollars for the benefit of everyone in the community.

Jim Lovelady, Ed.D., is the director of the Technical-Vocational Division of Angelina College in Lufkin, Texas. For 20 years prior to that, he taught

Drafting and Design Technology. He has been extensively involved in workforce development issues to include Quality Workforce Planning, Tech Prep, and School-To-Work.

Cesar Maldonado, P.E., is a registered Professional Engineer and president of a manufacturing company that employs approximately 200 people and competes globally. Maldonado serves his community in many capacities and is active in several national technical and trade organizations, including the American Society of Testing Materials, the American National Standards Institute, and the National Association of Architectural Metal Manufacturers, for which he chairs the Technical Committee of the Hollow Metal Division. Maldonado chaired the Lower Rio Grande Valley's Tech Prep Consortium from 1991 through 1994.

Lynn McGee recently accepted the position of Director of Career and Technology Education at Amarillo Independent School District, to help institutionalize Tech Prep, establish community relations, and further integrate academic and technical education. Prior to this, he was director of the Panhandle Tech Prep Consortium since its inception five years ago, where he advanced the cause of Tech Prep as a total education program involving academic and technology education. He helped establish 600 articulation agreements between area high schools and three community colleges. McGee also taught in the public schools for 19 years and served for four years as a special advisor to the government of Mauritius, an island in the Indian Ocean.

Ronald D. Opp, Ph.D., is the project director for the Effective Tech Prep Policies and Practices in Selected Career Areas grant received by the SPECAP Research Group at Texas Tech University. He has presented findings on Tech Prep educational reform in Texas at a number of national conferences focusing on workforce development. Dr. Opp also serves as the coordinator of the Community College Leadership area of study within the Higher Education Program at Texas Tech University.

Jeri Pfeifer has recently completed her first year as the Director of Career and Technology Education for Abilene ISD. Previously, she was principal of Abilene Cooper High School. Inherent to the first year in any new position, the need to identify resources and support systems was critical. The West Central Tech Prep Consortium provided multiple resources of time, information, personnel and budget, all of which were active and instrumental in the development of her article. As schools across the nation address Career Education as a K-12 curriculum, Tech Prep offered guidance and models to help the schools in this region develop community-appropriate school-to-work systems. The process continues.

Douglas L. Pickle, Ed.D., got his degree from East Texas State University. Since that time, he has accumulated seven years experience teaching and coaching in the public schools, eight years experience teaching and as department head at the university level, and six years experience teaching and as division chair at the community college level. In addition to this, he has more than seven years of industrial experience. Pickle has been involved in Tech Prep in Texas since its implementation. He was also one of the first in the state to apply to the Coordinating Board to convert all of his programs to Tech Prep.

Bethany Rivers is a graduate student working on her Masters in English with a minor in Higher Education. Currently employed as a graduate assistant for the SPECAP project, she finds extensive projects such as monographs and structures of knowledge challenging.

Patsy Sanford has a B.S. and M.Ed. in Counseling. She had taught for 30 years in Texas public schools, then has spent four years as career counselor. She is a published poet and author of children's stories.

Gene Schatz is in his fourth year as principal and secondary curriculum coordinator at Whitney High School, Whitney, Texas. For 28 years prior to that time he has been an assistant principal, athletic director, teacher, vocational coordinator, state planning and development official, mayor and city councilman in one of the 50 largest cities and schools in Iowa.

Since the first time he heard of the term Tech Prep he has attempted to design an entire high school curriculum based upon the principles used in this movement. Having worked closely with industry executives in his state and city positions, as well as he and his wife owning their own business, he knows what students need to be successful in the modern workplace. He has incorporated the philosophies of Spady, Schlecty, Glasser, Deming, Daggett and various reform reports into this revolutionary curriculum design.

The results have been that students have identified the relevancy of their school work resulting in higher achievement and attendance rates. Teachers are discovering new energies by concentrating on a direction for all instructional activities and within that mission, being allowed to have complete control over what they teach and how they teach.

Charles D. Schmitz, Ph.D., is the Dean of Education at the University of Missouri - St. Louis. Prior to coming to St. Louis, Dr. Schmitz was the

Dean of Education at Baylor University in Texas. He has been actively involved in higher education for nearly three decades, in teaching, administration, and research. He is a nationally recognized educational speaker and writer. His primary interest is technology applications for K-12 schools and universities.

Elizabeth A. Schmitz, Ed.D., is the Director of Assessment, Technology and Planning for the School District of Clayton in St. Louis, Missouri. Before joining Clayton, Dr. Schmitz was the Director of Computer Learning Technology for the Center for Occupational Research and Development (CORD). Over the past 27 years, Dr. Schmitz has served in various public education capacities including principal of a school recognized as a National Blue Ribbon School, a technology pilot site, and one of *Redbook's* America's Best Schools.

Peter Sisler has a work history of roughly seven years in computer systems and seven years of full time teaching. He has also done a variety of odd jobs including tutoring off and on since 1967. He has lived in Texas, Haiti, California, Ohio, Kentucky, Georgia, Canada (Ontario), and England. His masters degrees are in mathematics and physics, and he is finishing his doctorate in higher education at Texas Tech University. He has been researching the calculus problem and mathematics for 4.5 years and wishes to share his results with such educational renewal communities as Tech Prep.

Gloria Stewart is a doctoral candidate in the Higher Education Program at Texas Tech University. She received her Bachelors degree from Colorado Woman's College and Master of Public Administration degree from the University of Texas at El Paso. Currently a research assistant for the SPECAP project, she has over ten years of experience working in institutions of higher education in Texas.

Stephen B. Springer, Ph.D., is the Director of Occupational Education at Southwest Texas State University. He has worked closely with the Alamo Tech Prep Consortium and has served on the Executive Committee. In addition, he is President of the Board of Trustees for Schertz-Cibolo-Universal City ISD. In that capacity, Dr. Springer has a true vested interest in schools working closer with universities.

Lynda Sutliff, formerly a Tech Prep health occupations teacher in San Angelo, Texas, is pursuing a masters degree in nursing at Abilene Intercollegiate School in Abilene, Texas. She was a presenter at the third Annual Tech Prep Conference in Austin last spring. This work was previously published as "The English Translation" in the Vocational Education Journal, April 1996.

Ken Tunstall, Ph.D., is the Director of Workforce Education in the Community and Technical Colleges Division of the Texas Higher Education Coordinating Board in Austin, Texas, where he is responsible for the State's post-secondary Carl Perkins activities as well as Texas' Tech Prep and School-to-Work initiatives.

Dr. Tunstall earned a Bachelor of Science and a Master of Education degree in Mathematics from North Carolina State University in 1976. He has taught mathematics for a total of 17 years at the middle school, high school, community college, and university levels in Texas and in his native North Carolina.

Dr. Tunstall received his doctorate in Higher Education Administration with a minor in Mathematics at Texas Tech University in August of 1993, was a member and vice-president of the local school board while living in Sundown, Texas, and served as the Director for the Permian Basin Tech Prep Consortium in Midland, Texas, before assuming duties at the Coordinating Board.

Romona Vaughan is the Director of the North Texas Tech Prep Consortium. Romona graduated from Midwestern State University, located in Wichita Falls, Texas, with a Bachelor of Science in Education. She has worked as a legal secretary in a private office, the District Attorney's office, and was a classroom teacher at the college level and with proprietary schools before joining Tech Prep in 1992.

Charles Wendt, having spent most of his life working in industry and business, feels that he has a unique understanding of the educational background needed by the students exiting today's public school systems. Working and living in a small rural community makes it possible for him to see first hand the problems of retaining the higher quality of graduates and enticing these graduates to return to the community after completing college or technical training. He has spent the last three years working with other teachers and community leaders to make the job shadowing program and the participating students successful. Wendt believes that if education would be willing to allow business to become a working partner, educators would be able to provide a workforce that has learned how to learn and knows how to meet the expectations of the workplace.

SPECAP

Strategic Planning
Educational Cooperation
& Assessment of Performance
Effective Policies and Practices in Selected Career Fields
Lubbock, TX: Texas Tech University, SPECAP Research Group

BEST COPY AVAILABLE